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EDITED AND PUBLISHED MONTHLY BY

Simon J. J. Harger, V. M. D., Leonard Pearson, V. M. D., John W. Adams, V. M. D.

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THE
VETERINARY MAGAZINE.

VOL. II. OCTOBER, 1895. NO. 10.

CONTINUATION OF EXPERIMENTS TO DETERMINE THE EFFECTS OF FEEDING MILLET UPON HORSES.

BY T. D. HINEBAUCH,
Fargo, N. D.

We commenced a series of experiments to determine the injurious effects, if any, upon horses when millet was fed exclusively as a coarse food. These experiments began September 7, 1893, and for that year were published in the various veterinary journals of the United States, and also in the London *Veterinary Journal*. The paper was read before the First International Veterinary Congress of America, held at Chicago in December of that year. For the contents of that paper I would refer the reader to the journals of that year. The discussion following the reading of that paper indicated that the disease under consideration had been noticed by several veterinarians, among whom were Dr. Trumbower, of Illinois; Dr. Liautard, of New York City, and Dr. Lyford, of Minneapolis. Various theories were brought forth regarding the conditions which really followed the use of millet. Since then one or two articles have appeared in leading veterinary journals taking issue with the conclusions.

In order to get more definite data, we continued the experiments on the fifth of December, 1894, using for our purpose No. 3, a black mare, aged, weighing 1035 pounds, and a bay mare, No. 4, six years old, weighing 1100 pounds. The results of those experiments are indicated in the next table.

December, 1894.	No. 3. BLACK MARE. AGED											No. 4. BAY MARE. SIX YEARS OLD.								
	Time of Day.	Temperature F.		Water. Pounds.	Hay. Pounds.	Oats. Pounds.	Salt. Ounces.	Urine. Pounds and ounces.	Specific Gravity.	Number of Urinations.	Weight of Horse.	Temperature F. Horse.	Water. Pounds.	Hay. Pounds.	Oats and Bran. Pounds.	Salt. Ounces.	Urine. Pounds and ounces.	Specific Gravity.	Number of Urinations.	Weight of Horse.
		Air.	Horse.																	
	A. M.	16.5	100.2	16	6.5	2				2		100.6	9.5	6	2				0	
	N.	39	100	27	6.6	0				2		100.8	9.5	7	0				1	
5	P. M.	37	100.2	6.6	7	2	1	8–1	1056	2	1035	99.4	8.6	7	2	1	1–5	1061	0	1100
	A. M.	38	100.2	13.5	6.2	2				4		100.4	11.6	6	2				2	
	N.	45	100.4	13.5	6.5	0				1		100 4	13.5	7	0				0	
6	P. M.	41	100.6	18	7	2	1	8–1½	1056	2	1033	100.4	9	7	2	1	3–0	1055	0	1101
	A. M.	20	100.4	32.2	6	2				4		100.4	9	6	2				3	
	N.	37	99.8	10	6.2	0				1		100.4	9.5	7	0				0	
7	P. M.	36	100.6	8	7	2	1	7–1	1057	2	1042	100.2	11	7	2	1	3–14	1059	0	1102
	A. M.	32	100.2	32.5	6.5	2				4		100 2	10	6	2				2	
	N.	26	100	9	6.3	0				1		100.6	17.5	7	0				0	
8	P. M.	25	100.4	4	7	2	1	5–7	1060	2	1045	100.2	10	7	2	1	8–3	1060	1	1107
	A. M.	24.5	100	36	6.5	2				4		100 6	15	6	2				3	
	N.	31	100.4	1	6.5	0				1		100.6	6.5	7	0				1	
9	P. M.	32	100.4	25.5	7	2	1	8–8	1059	2	1047	100	15	7	2	1	1–2½	1053	0	1105
	A. M.	31,5	100	7.5	6.5	2				4		100,4	6	6	2				3	
	N.	32.5	100.2	19	6.5	0				1		100.4	15.5	7	0				1	
10	P. M.	32.5	100.4	12.5	7	2	1	7–7½	1056	2	1044	100.2	10	7	2	1	5–3	1061	1	1107
	A. M.	30.5	100	27.5	6 5	2				4		100	20	6.5	2				4	
	N.	33	100.2	10.5	6 5	0				2		100.4	5	6	0				1	
11	P. M.	32	100.4	9	7	2	1	7–13	1060	1	1047	100.2	6	7	2	1	4–2	1065	1	1116*
	A. M.	30	100.4	51.5	7	2				5		100.2	25	6	2				5	
	N.	31	100.2	9	6	0				2		100.4	11	7	0				1	
12	P. M.	27	100.2	12	7	2	1	11–0	1052	2	1050	100	14	7	2	1	5–13	1056	2	1117

	A. M.	11.5	100.2	36.5	5	2				7		100.4	16	6.5	2				5	
13	N.	32	100.4	7	5	0				2		100.4	24	5	0				1	
	P. M.	32	100.6	13.5	7	2	1	15–5	1045	2	1052	100.8	5 5	7	2	1	11–3½	1053	1	1115
	A. M.	26.5	100.6	38	5	2				7		100.4	18	5	2				6	
14	N.	38	100.6	12	5	0				2		100.6	15.5	5	0				1	
	P. M.	32	100.4	10.5	7	2	1	17–6½	1043	2	1055	100.6	12	5	2	1	13–15	1054	1	1117
	A. M.	15	100.4	32	6 5	2				7		100.2	10	5	2				5	
15	N.	23	100.6	14	5	0				2		100.6	14	6.5	0				1	
	P. M.	25	100.2	15	7	2	1	25–9	1038	2	1050	100 8	15	5.5	2	1	18–½	1040	1	1118
	A. M.	20	100.4	37	5	2				6		100.6	19	5	2				5	
16	N.	22	100.2	3	4.5	0				2		100.4	13	5	0				1	
	P. M.	14	100.2	12.5	6	2	1	28–6	1028	2	1050	190 6	11	6	2	1	25–6	1031	2	1106
	A. M.	10.5	100.4	32	7	2				5		100.2	7	6	2				5	
17	N.	25	100	12.5	5	0				2		100 6	22	6	0				1	
	P. M.	31	100.4	25	5	2	1	27–1	1030	2	1047	100.6	11.5	7	2	1	20–1½	1040	2	1104
	A. M.	18	100.2	16 5	6.5	2				6		100	14	5	2				2	
18	N.	30	100	27.5	5	0				1		100.4	11	5	0				2	
	P. M.	29	100.5	7.5	6.5	2	1	17–5	1035	5	1050	100.6	13	7	2	1	21–5½	1039	1	1110
	A. M.	20.5	100	33	5.5	2				4		99.6	95	6.7	2				3	
19	N.	40	100.4	22	6	0				3		100.4	24	6.5	0				2	
	P. M.	38	100.4	16	6.5	2	1	19–2½	1040	2	1049	100.6	6.5	7	2	1	25–6½	1040	1	1110
	A. M.	31	100	13.5	6	2				4		100.4	13.5	6 7	2				3	
20	N.	41.5	99.4	28	6	0				2		100.8	20	6.5	0				1	
	P. M.	43.5	100.6	8.5	7	2	1	21–2½	1040	3	1054	100.6	7	6.8	2	1	18–15	1048	2	1115
	A. M.	19	100.4	28	6	2				4		100.6	17½	6.7	2				3	
21	N.	14	99.2	19	6	0				3		100.4	7.5	6	0				2	
	P. M.	11	100.8	11	7.2	2	1	17–2½	1043	2	1055	100.1	17.5	6.8	2	1	14–10.5	1050	2	1120
	A. M.	8	100.4	37	6.8	2				4		100.4	15	6.2	2				4	
22	N.	17	99.8	15.5	6	0				2		100.4	10.5	6.2	0				2	
	P. M.	19	100.6	21.5	6.8	2	1	13–6½	1045	1	1054	100.2	10	7	2	1	20–9½	1060	1	1118
	A. M.	27	100.6	18.6	5 8	2				4		100	14	7	2				5	
23	N.	32.5	99.8	32	6.5	0				1		100.8	25	6.2	0				2	
	P. M.	32.5	100.6	14	6.5	2	1	20–14½	1045	2	1049	100.8	8	6.7	2	1	17–3½	1051	2	1120
	A. M.	15.5	100.1	28	6.5	2				3		100.4	10	6.3	2				4	
24	N.	15 5	99.8	14	5	0				2		101	16	6	0				3	
	P. M.	9	100	30	6	2	1	23–10	1040	3	1047	100.8	9	—	2	1	21–13	1045	3	1117†

* Hay changed to first feed of millet. † Millet to Hay, first feed.

December, 1894.	No. 3. BLACK MARE. AGED.											No. 4. BAY MARE SIX YEARS OLD.							
	Time of Day.	Temperature F.		Water. Pounds.	Hay. Pounds.	Oats. Pounds.	Salt. Ounces.	Urine. Pounds and ounces.	Specific Gravity.	Number of Urinations.	Weight of Horse.	Temperature F. Horse.	Water. Pounds.	Hay. Pounds.	Oats and Bran. Pounds.	Salt. Ounces.	Urine. Pounds and ounces.	Specific Gravity.	Number of Urinations.	Weight of Horse.
		Air.	Horse.																	
	A. M.	3	100.6	7	7	2				4		100.6	7	7	2				4	
25	N.	6	100.6	26	6.8	0				1		100.6	15	7	0				1	
	P. M.	8	100.4	3.5	6.8	2	1	16–15	1038	2	1050	99.8	2	7	2	1	16–6	1045	2	1116
	A. M.	1	100.2	5	6	2				3		100.6	7	6.7	2				3	
26	N.	— 3 5	99.4	37	6.6	0				1		100.2	13	6.5	0				2	
	P. M.	—11	99.4	2	7	2	1	15–15	1039	2	1055	—	7	7	2	1	9–2	1060	1	1117
	A. M.	—20	99.6	25	7	2				2		100.2	8.5	7	2				3	
27	N.	—16.5	100.4	24	6.2	0				2		100.4	16	6.7	0				2	
	P. M.	— 5	100.2	2	6.8	2	1	10–15	1048	2	—	100.8	16	7.2	2	1	12–7	1055	2	1120
	A. M.	1	100	4.5	6.8	2				3		100.4	2	6.8	2				4	
28	N.	18.5	100	37	6.6	0				1		100.6	16	6.8	0				1	
	P. M.	13	100.2	2	7	2	1	9–11	1044	2	—	100.8	6	7	2	1	7–10	1062	2	1116
	A. M.	14	100	12	6	2				2		100.2	13.5	7	2				2	
29	N.	14	101	27	7	0				2		101	13.5	7	0				2	
	P. M.	7	100	1	7	2	1	11–5	1047	2	—	101	5	—	2	1	9–12½	1062	2	1114‡
	A. M.	6	99.6	32	6	2				4		100 8	10	6.8	2				4	
30	N	9 6	99.6	20	7	0				2		100.8	15	6.5	0				2	
	P. M.	1	100	15.5	6	2	1	10–1	1046	2	—	101	16.5	6.8	2	1	10–7	1054	3	1117
	A. M.	7	99	19.5	6	2				4		100 8	19	6.5	2				5	
31	N.	12	100	17	6	0				2		101	14	6.8	0				2	
Jan. 1895	P. M.	6	100.4	16	7	2	1	19–15	1042	3	—	100.6	13	7	2	1	16–11	—	3	1117
	A. M.	—	100	15	7	2				5		100	12	6.6	2				5	
1	N.	—	100.2	24	5	0				1		100.	18	6.6	0				2	
	P. M.	—	—	25	7	2	1	18–11	1047	2	—	101 8	10	7	2	1	15–15	—	3	1120‖

‡ Hay changed millet, first feed.
‖ Millet was just nicely headed out, secured in good condition. Records were taken at 6 A. M., 12 N. and 6 P. M.

On January 1, 1895, we discontinued taking observations, but continued to use millet as a food, giving both of them what they wished to eat. At the beginning of the experiment the black mare was sound to all appearances, and the most critical examination did not reveal a diseased condition of either muscular or osseous structure. The bay mare had previously suffered with navicular arthritis to a slight degree, and on December 25, 1893, I performed neurotomy for the relief of the lameness—the low operation being the one employed. The hind legs were sound, and the most thorough examination failed to show a diseased condition.

On going to the barn, February 7, No. 3 was found standing in the centre of the floor trembling violently, having some time during the night broken her halter. When led back to the stall she moved with great difficulty, showing extreme lameness and tenderness of the hock joints, and February 10 had great difficulty in getting up; laid down during the night of February 10 and 11, but was unable to get up the next morning. With the assistance of three men we succeeded in getting the animal to stand up, but she could not stand alone. The symptoms gradually wore off, and at 3.30 p. m. she began to stand without any help. At that time the hocks were swollen, tender and sore to the touch, appetite gone, action of the kidneys arrested; she had not passed urine during the last twenty-four hours; refused to eat anything, except a little bran until February 16, when she again began to eat millet, but very sparingly, not taking hold of it in such a manner as to indicate a relish or even desire to eat. She gradually continued to grow better with returning appetite until March 11, when at seven o'clock in the morning she was again seized with violent trembling, and on examination of the stall it was found that the secretion of the kidneys had again been arrested, there being no passage of urine since the previous morning. She refused to eat, and gradually recovered until the evening of April 2, when she was again noticed to be ailing. During the night she lay down, but was again unable to get up without assistance. After being assisted to rise she stood, showing great lameness in the hind legs, and when she was led out to be killed at 2 p. m. on April 3 moved with great difficulty.

By a close observation of the foregoing notes, it will be seen that previous to each attack the kidneys had failed to secrete,

and that the appetite was gone. In one attack, that of February 10, she absolutely refused to eat any solid food until the sixteenth. During all this time she gradually grew better, showing that nature attempted to overcome the distressing effects produced by the feeding of millet.

Post-mortem Examination.—Contents of the abdominal cavity, including the intestines and liver, in normal condition as far as we could determine with the naked eye; the thoracic cavity the same. An examination of the various joints of the body, as far as we opened them, did not show a single one in which the cartilage covering the end of the bones was not injured to a greater or less extent. The cartilage on the tibio-astragaloid articulation of the left hock joint showed deep furrows running in a direction parallel with the motion during flexion and extension. Both grooves of the astralagus were partially denuded of cartilage, so that the corresponding elevations of the tibia which articulate in the grooves did not have cartilage interposed between them. The whole general appearance, instead of being of a bright, whitish, glistening color, was of a dark, dull color bordering on brown.

The synovial fluid which escaped from the joint when opened, instead of being of an amber color was brown and contained red blood corpuscles, indicating that inflammation was present.

On making an incision in the right hock joint, the synovial fluid which escaped was of a much more brownish-black color, and also contained red blood corpuscles. The cartilage had been removed in several places, and in one spot in the centre of the articular groove of the astralagus the bone had become pitted, showing that the disease had been present for some length of time. The other joints, including the pastern, fetlock, stifle, and both the head of the femur and acetabulum of the hind extremity, and also the pastern, fetlock, knee, elbow, shoulder joint of the front extremity and occipito-atloid articulation showed conditions similar to those which have been described as existing in the hock joints. The muscular and ligamentous attachments seemed to be firm, at least they could not be detached by traction, except those of the right hock joint. This undoubtedly was due to the extent of inflammation which was present.

ANALYSIS OF URINE, SHOWING DAILY AVERAGES IN GRAMS.

	Urine.		Specific Gravity.		Total Solids.		Ash.		Nitrogen.	
	No. 1.	No. 2.	No. 1.	No. 2.	No. 1.	No. 2.	No. 1.	No. 2.	No. 1.	No. 2.
Hay, 14 days	7035.6	5908.1	—	—	774.37	648.11	174.48	171.33	110.45	90.39
Millet, 10 days	14404.9	12258	1038.2	1037.3	1127.9	954.9	272.25	268.45	131.08	121.35
Hay, 4 days	9453	6846	1041.6	1046	708	573.69	—	—	125.7	106.79
Hay, both periods	8244.3	6377	1041.6	1046	726.18	610.9	174.48	171.33	118 07	98.59
Hay, advantage of	—6160 3	—5881	+.0034	+.0087	—401.72	—344	—97.77	—97.12	—13.01	—22.76
Per cent of gain or loss . .	74.73	92.22	—	—	55.32	56.31	56.03	56.68	11.86	23.09

The preceding analysis and following compilation of the records were made by Mr. Robert Reed, a senior student at this college.

The urine was increased with No. 1 from 8244.3 grams per day with hay, to 14404.9 grams with millet, an increase of 6160.6 grams or 74.73 per cent.

With No. 2 it was increased from 6377 grams per day with hay to 12258 grams with millet, an increase of 5881 grams or 92.22 per cent.

The specific gravity of No. 1 urine was decreased from 1041.6 with hay to 1038.2 with millet, a decrease of .0034, and with No. 2 it was decreased from 1046 with hay to 1037.3 with millet, a decrease of .0087.

The total solids in the urine were increased in case of No. 1 from 721.18 grams per day with hay to 1127.9 grams with millet, an increase of 401.72 grams or 55.32 per cent.

With No. 2 the increase was from 610.9 grams per day with hay to 954.9 grams with millet, an increase of 344 grams or 56.31 per cent.

In the case of No. 1, the ash in the urine was increased from 174.48 grams per day with hay to 272.25 grams with millet, an increase of 97.77 grams or 56.03 per cent.

With No. 2 the increase was from 171.33 grams with hay to 268.45 grams with millet, an increase of 97.12 grams or 56.68 per cent.

The increase of nitrogen from No. 1 was from 118.07 grams per day with hay to 131.08 grams with millet, an increase of 13.01 grams or 11.86 per cent.

With No. 2 the increase was from 98.59 grams per day with hay to 121.35 grams with millet, an increase of 22.76 grams or 23.09 per cent.

"Both horses were changed from millet to hay, October 1. On September 27, No. 1 passed urine twenty-seven times and exhibited considerable pain. No. 2 had two attacks of colic, September 22 and September 27. From September 23 to 27, No. 2 moved with a straddling gait when first moved. Both horses were ridden or driven from eight to twelve miles daily for exercise."

In November and December, 1894, an experiment was conducted at this station to make a further study of millet and its effects. The millet which was used was not ripened, but was

partially headed when cut and was well cured. Two animals were used in the experiment, No. 3, a black mare aged, and No. 4, a bay mare, aged seven years. They were fed for a period of seven days with hay and oats, then for thirteen days with millet and oats, returning for five days to hay and oats, and completing with a final period of three days with millet and oats.

The conditions were carefully regulated, animals exercised, and the urine caught, weighed and analyzed, the analysis being on next page.

Considering the animals when fed hay and oats to be in normal condition, which is certainly fair, we see the following changes when fed on millet: The urine was increased with No. 3 from 3317.11 grams per day with hay to 7301.69 grams with millet, making an increase of 3984.58 grams or 120.15 per cent. This seems a remarkable increase and indicates a marked action on the kidneys.

With No. 4 the increase was from 4611.48 grams per day with hay to 8097.71 grams with millet, an increase of 3486.23 grams or 75.5 per cent.

The total solids with No. 3 were increased, changing from 323.76 grams per day, when hay was fed, to 507.23 grams with millet, an increase of 183.47 grams or 56.67 per cent.

With No. 4 they changed from 393.7 grams per day with hay to 415.61 grams with millet, an increase of 21.91 grams or 5.56 per cent.

This indicates a great change in the composition of the urine in both animals, for there was not only a greatly increased flow of urine when the millet was eaten, but also a much larger amount of solids. This is especially noticeable in case of No. 3, which fact also shows how much easier one animal is affected than another, both having apparently the same treatment.

With the urea we see a great difference in the two animals, for with No. 3 the urea changed from 27.75 grams per day with hay to 99.88 grams per day with millet, an increase of 72.13 grams or 259 per cent, which is a most remarkable increase.

With No. 4 there was a change from 65.29 grams per day with hay to 63.07 grams with millet, a decrease of 2.22 grams or 3.4 per cent.

The albumen with No. 3 was not determined, as there were many impurities with it, but it was apparently considerably increased with the millet.

DAILY AVERAGES, GIVING ALL WEIGHTS IN GRAMS.

	Urine.		Total Solids.		Urea.		Albumen.		Nitrogen.		Ash.		Specific Gravity.	
Animal	No. 3	No. 4.	No. 3.	No. 4.	No. 3.	No. 4.	No. 3	No. 4.	No. 3.	No. 4.	No. 3.	No. 4.	No. 3.	No. 4.
Hay, I. Period .	1729.59	3377.99	—	415	—	—	—	—	—	44.45	—	138 74	1059	1058
Millet, I. Period	8131.53	8080.19	512.24	398.13	—	—	—	—	51.14	33.79	255.01	216.55	1046	1040
Hay, II. Period	4904 63	5844.96	323.76	372.41	—	—	—	—	32.92	38.26	174.86	166.91	1057	1043
Millet, II. Period	6471.85	7315.22	502.23	433 1	—	—	—	—	—	—	245	224.1	1055	1046
Hay, average both periods .	3317.11	4611.48	323.76	393.7	27.75	65.29	.72	6.94	32.92	41.35	174.86	152.82	1058	1050
Millet, average both periods .	7301.69	8097.71	507.23	415.61	99.88	63.07	*	14.63	51.14	33.79	247.5	220.32	1051	1043
Hay, advantage of	—3984.58	—3486.23	—183.47	—21.91	—72.13	+2.22	—	—7.69	—18.22	+7.56	—72.64	—67.50	+.007	+.007
Per cent gain or loss	120.15	75.5	56.67	5.56	25.97	3.4	—	110.81	55.35	18.3	41.54	44.17	—	—

* The albumen with No. 3 was not determined owing to the large amount of other material present, but it appeared to be considerably increased with the millet.

With No. 4, the albumen changed from 6.94 grams per day with hay to 14.63 grams with millet, an increase of 7.69 grams or 110.18 per cent.

The nitrogen with No. 3 changed from 32.92 grams per day with hay to 51.14 grams with millet, an increase of 18.22 grams or 55.35 per cent.

With No. 4 it was changed from 41.35 grams with hay to 33.79 grams per day with millet, a decrease of 7.56 grams or 18.3 per cent.

The ash with No. 3 was increased from 174.86 grams per day with hay to 247.5 grams with millet, a gain of 72.64 grams or 41.54 per cent.

With No. 4 the increase was from 152.82 grams with hay to 220.32 grams with millet, an increase of 67.50 grams or 44.17 per cent.

The specific gravity was decreased from 1058 to 1051 with No. 3, and from 1050 to 1043 with No. 4, the difference being .0007 with each animal.

The following tables are intended to show the comparison of Experiment I on Nos. 1 and 2, and Experiment II on Nos. 3 and 4, and show the actual differences and the percentage relations.

COMPARING EXPERIMENTS I AND II, USING GRAMS AND AVERAGES.

Animal		No. 1.	No. 2.	No. 3.	No. 4.	No. 1 and 2.	No. 3 and 4.
Urine . .	With hay .	8244.3	6377	3317.11	4611.48	7310.65	3964.3
	With millet	14404.9	12258	7301.69	8097.71	13331.45	7699.7
Specific gravity	With hay .	1041.6	1046	1058	1050	1043.8	1054
	With millet	1038.2	1037.3	1051	1043	1037.75	1047
Total solids .	With hay .	726.18	610.9	323.76	393.7	668.54	358.73
	With millet	1127.9	954.9	507.23	415 61	1041.4	461.42
Ash . . .	With hay .	174.48	171.33	174.86	152.82	172.9	163.84
	With millet	272.25	268.45	247.5	220.32	270.35	233.91
Nitrogen .	With hay .	118.07	98.59	32 92	41.35	108.33	37.14
	With millet	131.08	121.35	51.14	33.79	126.22	42.47

SHOWING PERCENTAGE RELATIONS OF EXPERIMENTS I AND II.

Animal		Harry and Jim.	No. 3 and 4.	No. 3 and 4. Per cent of No. 1 and 2.	Difference of No. 3 and 4, vs Harry and Jim.
Urine	With hay	7310.65	3964.3	54.22	3346.35
	With millet	13331.45	7699.7	57.75	5631.75
Specific gravity	With hay	1043.8	1054	100.98	.0102
	With millet	1037.75	1047	100.89	.00925
Total solids	With hay	668.54	358.73	53.65	309.81
	With millet	1041.4	461.42	44.31	579 98
Ash	With hay	172.9	163.84	94 76	9.06
	With millet	270.35	233.91	86.52	36.44
Nitrogen	With hay	108.33	37.14	34.35	71.19
	With millet	126.22	42.72	33.65	83.75

By these tables it may be seen that No. 1 and No. 2 excreted, while upon a hay dietary, 7310.65 grams urine per day, while No. 3 and No. 4 only excreted 3964.3 grams or an equivalent of 54.22 per cent of the amount by No. 1 and No. 2, the actual difference being 3346.35 grams.

With millet No. 1 and No. 2 excreted 13331.45 grams per day, while No. 3 and No. 4 excreted 7699.7 grams or 57.75 per cent of No. 1 and No. 2, the difference being 5631.75 grams.

With hay the specific gravity for No. 1 and No. 2 was 1043.8 and for No. 3 and No. 4 was 1054, which is 100.98 per cent of No. 1 and No. 2, the difference being .0102.

With millet, the specific gravity was 1037.75 for No. 1 and No. 2 and 1047 for No. 3 and No. 4, which is 100.89 per cent of No. 1 and No. 2, a difference of .00925.

With hay, the total solids for No. 1 and No. 2 were 668.54 per day, and for No. 3 and No. 4 were 358.73 grams or 53.65 per cent of No. 1 and No. 2, a difference of 309.81 grams.

With millet, the total solids for No. 1 and No. 2 were 1041.4 and for No. 3 and No. 4 they were 461.42 grams or 44.31 per cent of No. 1 and No. 2, a difference of 579.98 grams.

With hay, the ash for No. 1 and No. 2 was 172.9 grams per day, with No. 3 and No. 4 it was 163.84 grams or 94.76 per cent of No. 1 and No. 2, a difference of 9.06 grams.

With millet, the ash for No. 1 and No. 2 was 270.35 grams per day and with No. 3 and No. 4 it was 233.91 grams or 86.52 per cent of No. 1 and No. 2, the actual difference being 36.44 grams.

With hay, the nitrogen for No. 1 and No. 2 was 108.33 grams per day, with No. 3 and 4 it was 37.14 grams or 34.35 per cent of No. 1 and No. 2, the difference being 71.19 grams.

With millet, the nitrogen for No. 1 and No. 2 was 126.22 grams per day, with No. 3 and No. 4 it was 42.47 grams or 33.65 per cent of No. 1 and No. 2, a difference of 83.75 grams.

The effects on No. 3 and No. 4, aside from those given, were not marked during the experiment proper, but as the period was comparatively short and the feed changed often, this is not to be wondered at. There was, however, some swelling of the legs, especially the hock joints, which would indicate a somewhat abnormal condition.

SHOWING AVERAGE TEMPERATURE DURING EXPERIMENT.

	No. 3.	No. 4.
Hay, first period	100.32°	100.23°
Millet, first period	100.48°	100.27°
Hay, second period	100.59°	100 13°
Millet, second period	100.76°	99.98°
Hay, both periods	100.46°	100.18°
Millet, both periods	100.62°	100.13°
Advantage of hay	+ .16°	— .05°

[To be continued.]

HOW SHALL THE PRACTITIONER CONTINUE HIS EDUCATION?[1]

By Dr. A. R. Archibald.

For the benefit of the young veterinarian who is endeavoring to become a successful practitioner, we wish to make a few suggestions that may not pertain directly to Veterinary Science, still are very important for the practitioner to remember.

For convenience I propose to deal with this subject under three heads.—(1), the practitioner's duty to his clients; (2), his duty to his colleagues; (3), his duty to himself.

[1] Read before the United States Veterinary Medical Association at Des Moines, Iowa, Sept., 1895.

The veterinary practioner is of necessity thrown into contact with all classes and varieties of people, and it is necessary for him to do his duty under many and varying circumstances. Therefore, he cannot underestimate the importance of studying human nature in its various peculiarities, so that he may be prepared to appreciate and encourage human virtues, and meet with good temper, tact and success, human frailties in their many degrees and phases. The treatment of the client is just as important and in many instances more important than the treatment of the patient. It is absolutely necessary for the practitioner to take a deep interest in his patients ; he should avoid, if possible, considering his patients wholly as cases of disease. By showing an interest in, and a feeling for, the patient he will in the majority of instances retain the confidence of his client. In all connections with his client he should act upon honest principles, but should exercise tact and discretion in recommending treatment, especially in cases where treatment is unnecessary ; for, if the practitioner does not exercise some considerable tact and patience in the treatment of an imaginary disease, the result will probably be that his client will place the case in the hands of some unscrupulous empiric who might, by encouraging the weaknesses and peculiarities of the owner, succeed in lowering the reputation of the qualified practitioner in that community.

It will be readily seen that a knowledge of the proper methods of dealing with different clients is by no means the least important matter which the practitioner should strive to attain.

The practitioner's duty to his colleagues. There is generally a feeling among young practitioners against consultations, either private or public. It is necessary for them to learn the error of such a view. There is no greater mistake that a practitioner can make than to decline consulting with a fellow practitioner when a difficulty occurs in a case, or when a client becomes impatient. Young practitioners are generally apt to think that when a consultation is requested it denotes a lack of confidence in the attending practitioner, when very probably such is not the case ; whether it be or not, the practitioner will best forward his own interests by cheerfully agreeing to a consultation. It is possible that a consultation may involve a difficult and delicate question sometimes, as to honest expression of opinion in

reference to the real condition of the patient, the exact cause of disease, etc., but these matters can be properly and safely adjusted by the exercising of good, thoughtful judgment, and as a result confidence is restored in the mind of the client.

Of course, where a consultation is requested it will be policy for the attending practitioner to endeavor to have his client procure the services of a professional man who is versed in professional ethics.

A practitioner's duty to himself is the most important matter in which he should educate himself. It consists chiefly in retaining his self-respect. Every practitioner has knowledge pertaining to his patients which is of a strictly private character, and except in cases where dishonesty is intended on the part of the client, no practitioner is justified in disclosing it. He should beware of gossiping in connection with his practice. Gossip may be all very well in social matters, but it should be strictly excluded from all matters of a professional nature. Frequently, inquisitive individuals will try to extract information regarding the condition of a patient, etc. The practitioner in such a case should positively refuse to discuss this matter.

Punctuality is a habit that can and should be acquired by the practitioner who hopes to make a success. We have known of several instances where the practitioner has lost that lucky chance which is not infrequently the beginning of success.

Be courteous. Few men are more tried than members of the Veterinary Profession. We realize that human nature is such that under all the circumstances in which the veterinarian is placed, he cannot always command a sweet and unruffled temper, but he should learn to do his best in order to retain his self-respect. There is a popular idea that veterinarians are continually quarreling among themselves. This idea is usually an exaggerated one, but unfortunately there are some grounds for it. Two causes appear to act as exciting influences in producing professional disputes. One is, that clients too frequently forget the services of their veterinarian, and in their anxiety, or in search of novelty, rush from one practitioner to another without proper consideration for their veterinarian's feelings. The other is, that in some localities professional competition is very active, and where many are struggling for work and

existence, friction becomes serious. The practitioner, in order to retain his self-respect, should conform strictly to professional etiquette which is nothing more or less than the Golden Rule, "Do unto others as you would that they should do unto you." The veterinarian should be always ready to assist a brother practitioner, providing he is not below the proper professional standard. Veterinarians, like other individuals, will receive insults, but in the majority of cases the practitioner and the individual have themselves to blame for it. The practitioner should learn to know when the limits of professional endurance are reached, and when it is proper for him to insist upon a just recognition of himself and his profession.

Whatever difficulties and anxieties the practitioner may meet in practicing his profession, he should bear in mind that the highest and noblest aim of his profession is to assist and relieve the suffering animal. In carrying out this high principle he may be imposed upon, and may meet with ingratitude and insult, but he can rest assured that if he practices his profession in a thoroughly honest and conscientious spirit he will receive in return tokens of sincere gratitude which will more than counteract his unpleasant experience.

All this and more will the young practitioner have to add to the store of knowledge gained at college before he can lay claim to the enviable position of a successful veterinarian.

THE WORK OF FOREIGN VETERINARIANS ON BOVINE TUBERCULOSIS.[1]

By Dr. Leonard Pearson,
Veterinary Department of the University of Pennsylvania.

Mr. President and Gentlemen:—In the short time that I shall occupy I shall express no views of my own, but shall call to your attention some of the recently expressed opinions of European veterinarians on the subject of bovine tuberculosis, and some European practices and rules in relation to this matter.

[1] A paper presented to the New York Academy of Medicine, November 8, 1895.

This subject has been a live one in Europe for many years, and has received much attention ever since it was shown by Villemin, in 1868, that the disease could be transmitted from one animal to another, and more especially since the discovery of the tubercle bacillus by Koch in 1882, and the consequent establishment of the fact that the tuberculosis of men and the lower animals is the same disease and caused by the same germ. The first practical application of this knowledge, with a view of preventing human infection through the ingestion of tuberculous food of animal origin, was in relation to the inspection of meats. Without tracing the development of official meat inspection in the various countries of Europe, suffice it to say that most of the European countries have a more or less perfect system of meat inspection, which is carried out most carefully in the great centres of population, and usually insures the consumer against harmful flesh.

The method that is in vogue in many cities in Germany, and is being extended as rapidly as possible, consists in the erection of a municipal abattoir in which all local slaughtering must be done, and where the food animals can be examined by the veterinarians stationed there, both before and after slaughter. This allows a perfect inspection, which is impossible when the killing is done in a great number of small slaughter houses scattered throughout a large city.

The question as to what shall be done with tuberculous carcasses has excited much discussion. There is a great unanimity of opinion in reference to the carcasses of animals that show generalized tuberculosis, or tuberculosis with marked emaciation; they should be destroyed outright. But cases of localized tuberculosis are much more common, amounting in some places to fifteen or eighteen per cent of all cattle slaughtered, and to destroy these carcasses would occasion a great loss which should be avoided, if it is possible to do so without prejudice to human health. The careful experiments of Chauveau, Nocard, Bollinger, Bang and McFadyean have shown that the flesh of animals with local tuberculosis is not infectious. But Ostertag and others call attention to the fact, which is brought out more clearly by the Royal Commission on Tuberculosis in its report of 1895, that healthy muscles may carry tuberculous lymph glands between them, and that in dressing carcasses the butcher frequently gets tuberculous material on his knife, if such

exists in any part of the body, and thus spreads it onto otherwise harmless meat. Hence, it has been evident for a long time that great care must be exercised in judging tuberculous carcasses. Since 1886 it has been the custom in some countries, as in Portugal, to destroy the carcasses of all tuberculous animals, and in Italy, Austria, France, Germany and Belgium much flesh was formerly destroyed that is now saved. When meat inspectors were few, and systems imperfect, it was necessary, in order to be on the safe side, to have few and rigid rules, but with the increase of experience and knowledge it has been found that these rules can be modified and made flexible when they are enforced by skilled men. At the International Veterinary Congress, held last September in Berne, it was decided by resolution that the flesh of tuberculous animals should be condemned when the carcass is emaciated, when it has a general bad appearance, when tubercles are found in the muscular portions, and when alterations are found in several organs. It was also recommended, in relation to the flesh of slightly tuberculous animals, that it be permitted to go on the market, that it be sold in special shops or stalls, or that it be sterilized and sold as cooked meat. But this resolution implies a doubt as to the wholesomeness of some of the meat passed, and leads one to the conclusion that a fear exists that the rules for condemning are not sufficiently comprehensive. In Germany the practice is to condemn the worst cases, sterilize those that are less extensive, and to pass as sound the slightly developed cases, after destroying the affected parts.

A very important point in connection with this subject is in reference to the payment of indemnity to the owner of the condemned animal or carcass. The opinion has spread rapidly of late years that where an animal is condemned for the good of the public, the public should bear a part of the loss. That this view is established abroad is shown by another resolution adopted by the International Veterinary Congress, to the effect that owners should be compensated for animals destroyed, and this is already the practice in France.

The consideration of the milk from tuberculous cows is another major division of this subject, and probably of greater importance to the sanitarian than their flesh, for while the latter is usually eaten after cooking and more or less complete sterilization, the former is usually consumed raw.

Numerous investigations have demonstrated that the milk of cows with tuberculosis of the udder will cause tuberculosis in a very large percentage of the experimental animals fed upon it, and in reference to such experiments the Royal Commission on Tuberculosis reports in these words: "We cannot refuse to apply, and do not hesitate to apply, to the case of the human subject the evidence thus obtained from a variety of animals that differ widely in their habit of feeding—herbivora, carnivora and omnivora. As regards man we must believe—and here we find ourselves agreeing with the majority of those who gave evidence before us—that any person who takes tuberculous matter into the body as food, incurs some risk of acquiring tubercular disease. By 'tuberculous matter' we mean here, of course, that which is capable of giving rise to tuberculosis in lower animals."

The active bacilli of tuberculosis have been found in the milk of tuberculous cows by numerous investigators, and among them such distinguished veterinarians as Chauveau, Nocard, Bollinger and Johne.

At the Seventh International College of Hygiene, held in London in 1891, Professor Bang, of Copenhagen, reported his experiments with fifty eight tuberculous cows, of which nine were found to give virulent milk. He expressed the opinion that a tuberculous cow with udder apparently healthy is not, in the great majority of cases, dangerous, although she is undoubtedly so sometimes, and is always suspicious. Professors McFadyean and Woodhead, who reported at the same time, demonstrated the extreme danger of cows with tuberculous udders, and the occasional infectiousness of milk from cows with the disease in organs other than the udders. From the results obtained from the experiments, and by all other investigators, they conclude that the milk obtained from tuberculous animals may be instrumental in causing the disease in man, and that there is great necessity for legislation on this question.

They state further that the first thing to be insisted on is that a regular staff of veterinary inspectors, well trained for this special work, shall be appointed, whose special duty it must be to examine fortnightly all the cows giving a milk supply, and who should have the power to order isolation of all cattle in which the presence of tuberculosis is suspected.

In the more recent report of the Royal Commission on Tuberculosis in Animals, the statement is made that "the withdrawal from dairies of every cow that has any disease whatever of the udder would form some approach to security against the serious danger incurred by man from the use of tuberculous milk, but it would not be an adequate security. The presence in a dairy of a tuberculous cow, the report says, is a decided source of danger to the public, especially having regard to what has been learned respecting the rapid development of tuberculosis of the udder, and the degree of danger to the milk consumers incurred by the invasion of the udder in tuberculous cows.

Attention is also called in this report to a most important observation in reference to the alarming rapidity with which tuberculosis of the udder may develop, and cases are cited in which this condition became evident between fortnightly inspections. The investigators for the commission insist that no tuberculous animal of any kind should be allowed to remain in a dairy. Ostertag has called attention to the fact that to exclude from sale the milk of all cows that react to tuberculin would mean a great shrinkage in the milk supply in some places, and would cause a great and oppressive rise in the price of this necessity. He recommends therefore that the milk from cows with tuberculosis of the udder should be excluded from consumption, and that from cows which react to tuberculin, but show no evidence of tuberculosis of the udder, should be sterilized before sale.

Another important division of the subject assigned to me is that in reference to the eradication of this disease from herds; and since all exterminative measures necessitate the diagnosis of disease in the living animal, I shall present some views in relation to tuberculin as a diagnostic agent, for diagnosis without this agent is so inaccurate and untrustworthy, except in advanced cases, that it now receives but little credence. The use of tuberculin is so recent, and its career as a therapeutic agent was so short and disappointing, that there was as strong feeling against its employment as a diagnostic agent in cattle practice until its worth and harmlessness had been demonstrated beyond a doubt. Nocard in France, Bang in Denmark, Guttman in Russia, and Siedamgrotzky in Germany, have taken the lead in this work.

The original researches with tuberculin showed from ten to fifteen per cent of failures to diagnose correctly, but with improved methods and increasing experience the proportion of failures in the hands of careful veterinarians is now so small as to be almost disregarded. Nocard, Guttman and Bang, who have had the most experience with this agent, claim almost invariably exact and accurate results. There was a tendency among a few veterinarians at the recent International Veterinary Congress, and notably on the part of Guillebeau and Hess, of Berne, to oppose the use of tuberculin for diagnostic purposes on the ground that it caused pre-existing tubercular processes to become generalized. This view, however, was not supported by any of the other veterinarians present, and was expressly refuted in the resolutions adopted. These resolutions, which represent the most recent opinions of the foremost veterinarians in Europe, and which were adopted at the International Veterinary Congress held but two months ago, are of great interest to us, for they are based on five years of trial, experiment and practical application of this agent, often in the face of strong opposition, and always under careful, scientific supervision.

Resolution No. 1 is: "Tuberculin is a very valuable diagnostic agent, and can yield the greatest assistance in combating tuberculosis. There is no reason for objecting to its general application on the ground that it may aggravate pre-existing tuberculous lesions."

Resolution No. 2 is: "The Congress expresses the desire that governments shall order the employment of tuberculin in herds in which the existence of tuberculosis has been established."

The official veterinarians of Germany are advised to use tuberculin, and are supplied with it at a low cost from the government laboratories.

A law is now pending in France that will make the use of tuberculin compulsory in all herds in which tuberculosis has been discovered. The infected animals are to be slaughtered, but if they present no clinical evidence of tuberculosis, and the owner wishes to prepare them for slaughter, he is allowed to keep them under quarantine for one year. If upon slaughter it is found that the flesh is unfit for food, the owner will recover an indemnity equal to one-half of the value of the condemned meat. If clinical evidence of tuberculosis exist, the animal

must be slaughtered at once, and the owner receives but one-fourth of the value of the condemned meat.

In Dieckerhoff's "Lehrbuch der speciellen Pathologie und Therapie für Thierärzte," published in 1894, and generally recognized as the most reliable work on veterinary practice, this statement occurs: "It is for the owner's interest to have his herd tested with tuberculin in order to discover the suspicious animals, so that they may be separated and placed in another stable, and slaughtered as soon as possible. The calves from tuberculous bulls and cows should not be used for breeding. If these prophylactic measures are not observed, it can happen and has frequently been exemplified that the value of the herd will be destroyed."

One of the prominent and important steps in all plans for the restriction of bovine tuberculosis that have been proposed by European veterinarians is the compulsory meat inspection. This furnishes information respecting the location of infected herds, and enables much of the flesh of condemned animals to be saved. While without a general system of meat inspection, more time must be devoted to the discovery of infected herds, and the flesh of most of the animals in which tuberculosis is diagnosed must be lost.

So much ground has been covered that I hope I may be allowed in closing to make a very brief résumé of some points still unsettled in this country, on which the veterinary profession in Europe is practically unanimous. This résumé is based upon resolutions adopted at representative gatherings of veterinarians during the past two years, or on the *unopposed* publications of distinguished veterinarians.

1. The system of compulsory meat inspection should be general.

2. The flesh of tuberculous animals should be subject to special regulations.

3. A part of this flesh must be destroyed, but some of it may safely be used for food.

4. The milk from cows with tuberculous udders is extremely dangerous.

5. The milk from tuberculous cows with apparently healthy udders may be dangerous, and is always suspicious.

6. Tuberculin is a reliable diagnostic agent.

7. There need be no fear that tuberculin, properly used, will cause generalization of pre-existing disease.

8. All tuberculous herds should be tested with tuberculin, and the tuberculous and healthy animals separated.

9. Since tuberculosis of cattle is of importance in relation to public health, as well as of importance in relation to the live stock industry, it is to the interest of everyone that the disease be restricted as much as possible. Hence, when it becomes necessary to condemn tuberculous animals or carcasses, the public should share the loss with the owner.

HEREDITY THROUGH THE INFLUENCE OF THE FIRST MALE.

By S. J. J. Harger,

Professor of Anatomy and Zoötechnics, at the University of Pennsylvania.

We understand by this title the influence of the first male upon the offspring of succeeding males from the same female, or the *infection* of the female, through pregnancy, by the first male producer. This form of heredity, although rare, frequently occupies the attention of the breeder and sometimes admits of a difficult scientific interpretation. It is popularly said that in woman the children of the second husband resemble in some characters those of the first marriage. Again, it is said that if a mare is bred for the first time to an ass, and, subsequently to a stallion, the foals from the latter will have some of the characters of the asinine species.

This opinion is still more prevalent among dog fanciers, who often reject a valuable bitch because from accidental circumstances her first litter of puppies was from a cur. In one instance, it is cited that a woman married to a deaf and dumb man had a child with the same infirmity; the first child from the second husband was deaf and dumb, while the succeeding ones were healthy.

In the domestic species, observations have been made, which could be interpreted in the same manner. Breeders of thoroughbred horses say that a mare bred to a common stallion will not afterward produce true thoroughbred foals. The

classical example of Lord Morton's mare is familiar to all. Magne mentions that white ewes bred to black rams and afterward to white rams will produce, with the latter, lambs that are pied or have the eyelids, lips and legs black.

This hereditary influence is very questionable, and, from what we know of the physiology of pregnancy and the development of the fetus in the uterus of the mother, its existence has been denied by most observers who have studied it in a scientific manner.

Various explanations have been offered to explain this strange phenomenon :—

1. Many instances can be interpreted by the *law of atavism*, or reversion in some characteristics to a former ancestral type. Thus, if foals have zebra-stripes and mule characteristics, it must be remembered that the ancestors of the horse had the same peculiarities. There is a race of horses in India characterized by zebra markings, and those without them are not considered pure. We see variations as to form and color in a litter of puppies, but careful inquiry often reveals that these same peculiarities are inherited from an ancestor. The pedigree is impure. The same can be said of sheep and cats. Heredity can go back for many generations.

2. The *imagination of the mother* is advanced in the human family. Even if in this species the mental impression of the female should play such an important part, it is doubtful if the same faculty plays any rôle in the sexual act among animals.

3. Another hypothesis is *antidated copulation;* that is, that the impregnated ovum lies dormant in the womb for a long time, only to develop after a subsequent foaling has taken place. This is seen, it is said, in the roe-deer. But in the domestic animals actual observation precludes such a possibility ; which, besides, does not prove any influence upon the female herself.

4. *Imperfect Impregnation of the Ovum.*—It has been compared to what takes place among turkeys. The gobbler in a single coition impregnates twenty eggs, which develop and are laid over a more or less extended period, the first being more perfectly impregnated than the last. So it has been suggested that in the mare an ovum is imperfectly impregnated, only to develop at some future time.

5. The *direct influence of the male element* (spermatozoön) not only upon the ovum, but upon the whole organism of the female. This is based upon the fact that, according to Barron, in crossing plants, the pollen of plants, which corresponds to the spermatozoön of animals, not only influences the ovule, but entirely changes the character of the fruit.

6. *Vaccination Theory.*—It has been suggested by Cornevin (Treatise on Zoötechnics), comparing the phenomena seen in certain diseased processes, that the mother is not influenced by the male element directly, but *by means of the fetus.* "Could it not be possible that the latter possesses in its blood certain special properties obtained from the male and which, interchanging with that of the mother, act upon her as vaccine does upon the vaccinated?" The blood of the mother thus impregnated may act upon the ovum fecundated subsequently by another male.

En résumé, while much can be learned by comparing these phenomena in the domestic animals with those in the lower animals, in plants, and with certain pathological conditions, the question of the infection of the mare is still perhaps not entirely solved. The major portion of the evidence, however, is against it; the instances cited are frequently misinterpreted and can be very often explained by the law of reversion—atavism—although observations upon this point, whenever possible, are not without interest.

EXTINCTION OF TUBERCULOSIS IN HERDS.[1]

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In dealing with diseases in the lower animals, there are various possibilities and limitations which do not enter the field of medicine as applied to man. These must ever be borne in mind if the veterinary sanitarian would have his work prove a success. As applied to tuberculosis these considerations must largely influence us in the choice of methods, and in their

[1] Read by Professor Law before the New York Academy of Medicine, November 8, 1895.

application in the sanitary field. Prominent among such considerations are :

1. The facility with which the contagion may be checked by the death of all infected animals.

2. The possibility of arresting the career of contagion by breeding only from insusceptible strains of blood.

3. The impossibility of applying effective methods because of the financial ruin which would be entailed.

1. Destruction of the Infected.

Under the first head—the checking of the contagion by the killing of the infected—the principle being altogether inapplicable to dealing with man, the physician naturally thinks first of segregation, disinfection and a police control of the sick. With the veterinarian, on the other hand, free from any sense of the sacredness of the life of the sick, the first thought is a purely economical one, namely : Will the cost of the seclusion and care of this animal, and of the probable infection of others, outvalue the prospect of its recovery and the actual worth of the animal when well again ? With any virulent and dangerous disease there can only be one answer to this question, namely, that economy demands the extinction of the contagion at the expense of the first victim, before ten or a hundred more shall contract the disease. With a subject, the actual sound value of which may have been anywhere between ten dollars and one hundred dollars, the administration of such police control as would guarantee the prevention of the extension of the infection through man, beast, bird or inanimate object, would, as a rule, more than use up the price of the first victim. Every day of delay in shutting up these factories of contagion places a greater balance on the wrong side. The economical soundness of this position has been now so often illustrated on a large scale, and in regard to so many different diseases, as rinderpest, lung plague, sheep pox, glanders and rabies, that, for those who have made a special study of it, it has passed from the field of discussion into that of established truths.

2. Insusceptible Families.

In regard to the second question, that of propagating insusceptible families only, while it is, equally with our first proposition, impossible of adoption in the human family, as interfering

with personal rights, it is certainly available for the lower animals, over which the State can exercise the right of eminent domain, and enforce a police control for the common good. In animals, as in man, there are certain families which show a strong susceptibility to given infections, and others that show an equally potent resistance, and if it can be shown than no more serious interest is threatened by such a course, it is quite within the power of the State to exclude the first named class from reproduction, and to breed only the families which show the comparative immunity. A principle of this kind is already in force in certain countries, in which all stallions are licensed, and those are excluded from stud uses which are calculated to deteriorate the breed of the district. The same principle is in force in the Channel Islands, where no cattle except those of the native breed are ever allowed to enter a herd.

3. Economic Limitations.

In the third place, we are confronted by the question of economic limitations. It may be said that where human health and life are involved, no question of mere economy should be allowed to enter. But the economic question may be so far-reaching that the evil to humanity would be greater in the end, and our boasted liberality for sanitary needs would itself in the end defeat the much coveted sanitary object.

Deferring for a moment the question of the immediate influence on human health, let us glance at the national wealth in farm animals. The United States own in round numbers $1,500,000,000 worth of farm stock, and in this are included 16,000,000 head of milch cows and 20,000,000 head of other cattle. The cows produce yearly 5,209,125,567 gallons of milk, or 315 gallons per head. Of the other cattle probably 5,000,000 are killed yearly for human food, representing 1,000,000 tons of beef. This cannot be materially restricted without dealing a serious blow to our national prosperity.

While it must be conceded that animals would acquire a greater power of resistance to tuberculosis if kept in the open air, and in a condition more nearly approximating the natural one, yet if we let the milch cow revert to the condition of the native Texas cow, which can only scantily support its calf, and if we remand the beef animal to its native state, in which it took four years to reach maturity, in place of putting him on

the market as prime beef at two years old, we render the whole cattle industry unprofitable. Under such conditions our stock owners can no longer compete in the markets of the world, and this branch of live stock must be abandoned. But if abandoned, the exhaustion of our soils is a necessary consequence, and in due time agriculture, in its turn, must become unprofitable, and with its decay we shall reach the end of our whole national prosperity built upon our abundant agricultural products.

Whatever we do with our domestic animals, we dare not cause them to revert to a state of nature. This would be to throw away the achievements of the labor and skill of centuries, and would entail the most serious retrogression of the nineteenth century civilization. As well propose to abandon the modern triumphs in steam and electrical engineering.

The abnormal productiveness of the present farm animal is one of the most substantial foundations of modern prosperity, and it would be an economical blunder, and finally a sanitary one, to seek its abandonment or limitation. So far as we can secure innate immunity within the productive families, our work will be sound, and so far as we can produce an acquired immunity by hygienic measures we are laboring in the right line, but the line must be drawn wherever these protective measures tend to seriously impair the capacity of the breed for profitable uses.

These considerations tend to clear up our field of veterinary sanitary police, and to narrow it to the limits which are at once the most indispensable and the most effective. One measure stands out above all others as the one which must never be lost sight of, and to which all others must be held as accessory and subservient. This measure is the extinction of the disease-germ.

Feeding from Separate Troughs.

Where from any cause the immediate extinction of the germ is impracticable, an all-important precaution is to teach each animal to use its own stall only, and to have the stalls so separated in front that no two cattle can feed from the same trough. For the same reason no common feeding trough should be used in yard or field, and there may be danger in using a common drinking trough or bucket.

Salting Troughs and Front of Stalls.

In view of the fact that tuberculosis is largely propagated by the dried up virulent expectorations, which are raised and diffused in the form of dust, the daily sprinkling with a strong brine of the front of the stall, the manger and the passage in front, proves an important protective measure. Condensing the moisture of the air, the salt keeps the surface constantly damp, and prevents the sputa from drying up and rising as an impalpable powder. The salt is not only harmless, but wholesome, and has besides a very slight bactericidal action. In cold barns, below freezing, the salt may be replaced by a weak solution of sulphuric acid.

Open-Air Life.

So far as possible a free open-air life should be secured for the stock. In city and suburban stables the infected may reach anywhere from 6 to 90 per cent, whereas among 2,250,000 of our fat range cattle the tuberculous did not exceed 0.02 per cent. The comparative absence of viable bacteria in the air of the pastures, and the action of full sunshine in devitalizing the bacillus tuberculosis in a few hours, while it may live for months in an ordinary room, are sufficiently instructive in this connection. In the Northern States, where cattle must be sheltered indoors for five or six months of the year, too great care cannot be taken to secure ample windows and sunshine as well as free air in the stables. Darkness in the stalls reduces the quality and number of the red globules and the vitality and power of resistance of the animal, so that it virtually burns the candle at both ends, preserving and multiplying the germ and increasing the susceptibility of the animal.

These considerations strongly condemn the city and suburban dairies. Other things being equal, the larger the city the greater the number of floating bacilli, and the greater the susceptibility of the animal system. In French towns of 5,000 inhabitants the ratio of tubercular persons is only half as much as in towns of 100,000 to 500,000. In German abattoirs the ratio of tuberculous cattle is about 5 per cent of all slaughtered, yet Ostertag gives the ratio for old cows in the Berlin slaughter-houses as 75 per cent. The ratio is greater in our city and suburban dairies to-day than it was years ago, when a large

proportion of the fresh cows were killed off by lung plague within three months after their purchase. There remains, however, this redeeming element—that the city dairyman finds it unprofitable to keep the same cows from year to year, and as a slow disease like tuberculosis finds insufficient time for abundant development, the result is better for the city dairy than it otherwise would be. The case is worst with a thoroughbred herd in the city or suburbs in which the old cows are kept so long as they will breed, as there are here the combined evils of a generally contaminated atmosphere; of indoor life in a barn too often infected; and in too many cases a bodily constitution rendered increasingly susceptible by inbreeding. Once start the infection under such conditions, and the affection is liable to become concentrated by a series of successive reinfections in the same animal, so that not only are cases multiplied, but generalized cases soon come to prove the rule rather than the exception. Everything considered, the city and suburban dairies are surrounded by greater dangers than the country ones, and this should be taken into account alike by the dairyman himself and the sanitarian who would protect humanity against the bovine source of infection.

Further Precautions.

Among the further precautions which are within the control of the stock owner himself are the following:

Avoid breeding too young. The immature system is easily debilitated.

Don't unduly stimulate the milk secretion. Let the diet be always sufficient to fully sustain the vital powers as well as lactation.

When the cow goes dry don't allow her to suffer from insufficiency or unsuitability of the food.

Correct all conditions of ill-health. Debility is an urgent invitation to the bacillus. On the other hand the most phenomenal powers of digestion, assimilation, and rapid growth and fattening, give no guarantee of protection when the germ is implanted. Professor Bang tell us that the disease was virtually unknown in Danish cattle until 1840, when it was introduced in some purchases from Schleswig and later in in 1850 by large importations of English Shorthorns, and now

the Copenhagen abattoirs show 17 per cent of the cattle tuberculous, and the tuberculous test on 19,462 cattle showed 61.6 per cent tuberculous.

Old and unthrifty cows should be excluded from the herd. Twice to six times as many old cows as of young ones are tuberculous. The first sign of unthriftiness should be a warrant for separation from the rest of the herd, and especially in the case of the aged. Better still to use the tuberculin test to decide whether the animal should be promptly slaughtered.

Don't buy from a herd which has furnished cases of tuberculosis in recent years. Here again the safe course is to admit only such as have stood the test with tuberculin.

Let no tuberculous person care for the herd. The tuberculous person is a source of greater danger to the herd than is even the tuberculous animal. The latter can be confined to one place and the virulent sputa can be prevented from drying and rising as dust, but for the attendant there is no such limitation and his discharges are all the more dangerous. In one herd where three of the family in charge had died of tuberculosis I found nineteen of the twenty-six cows badly affected.

By attending to such precautions, by killing all tuberculous animals and safely disposing of the carcases, and by thoroughly disinfecting all the products, the stock owner may reasonably hope to purify his herd of the infection and to keep it sound.

I have purposely omitted all reference to methods of treatment, as these, however good for a human patient whose life must be spared, necessarily entail a long continued administration and are attended by too great expense and uncertainty of result to warrant their recommendation for animals when the object is to stamp out the disease.

Sanitary Police for Tuberculosis in Herds.

In considering police methods for tuberculosis in herds, our past experience in dealing with plagues of animals does not furnish an exact counterpart. The absolulely successful results in the different parts of the world with rinderpest, lung plague, sheep-pox, rabies and glanders, were obtained with diseases which confined their ravages to animals, or which in attacking man, entailed an acute and fatal disorder, so that the agency of man in propagating the contagium could be practically eliminated. In tuberculosis on the other hand we confront

a disease which even in man often follows a tardy and occult course, and which is at all events habitually chronic, so that the contagium must be preserved so long as the phthisical man is allowed to go at large. It is not, however, so diffusive as the contagia of rinderpest, lung plague or sheep pox, and hence the same absolute seclusion is not necessary to prevent its propagation.

If we could exclude dairy herds from cities and other dense aggregations of humanity, and see to it that consumptive persons were debarred from caring for, or mingling with cattle and other susceptible animals elsewhere, we could proceed with the extinction of bovine tuberculosis with the same confident expectation of success as we have in the past undertaken the extinction of the plagues of animals already referred to. So long, however, as such separation is unattainable we must be content to be satisfied with less perfect results, and must stand ready to repeat the process of extinction in the same herd as often as it may become necessary. Even with this drawback, however, we can promise a practical extinction of the affection in our herds and a reasonable guarantee of the soundness of our dairy and butcher products.

For the Speedy Extinction of Tuberculosis in Herds.

In this direction I cannot do better than to repeat my suggestion in the report of the tuberculosis commission for 1894:

"All herds of the State would be examined and tested with tuberculin as speedily as possible, the diseased animals would be condemned, appraised, killed and safely disposed of, the premises disinfected, other genera of animals that have lived with the diseased" (cattle) "would be examined, and if necessary safely disposed of, vermin would be killed, and all consumptive persons would be advised" (enjoined) "against attending on the purified herd or preparing their food. Finally all new purchases would be kept apart from the herd until they had been tested with tuberculin! In this way every step would be so much clear gain, and what had been once accomplished could be looked upon with reasonable confidence as a permanent success."

The continued testing of new purchases and the repeated examination of the herds, at long intervals, would be required as, at first, isolated cases would appear from bacilli which had

lodged on the digestive or respiratory mucosæ, but which had not colonized the tissues prior to the tuberculin test, and also from other accidental outside sources. Necropsis of all animals dying or killed would also be requisite so as to insure that no seeds of the disease should be overlooked in the herd to break out later. The most serious objection to this prompt and effectual method is the lack of a sufficient appropriation. For indemnities alone, at twenty-five dollars per head, 4 per cent of our 2,500,000 head of cattle (100,000) would demand $2,500,000. If we add to this the cost of the inspection of the whole bovine race in the State, and of animals kept with them, of appraisements, and of administration generally, we could not calculate on less than $3,000,000 as a working fund. Another drawback is the lack of professional men sufficiently acquainted with the use of tuberculin and with the diseases of animals generally to satisfactorily fill the role of inspectors. It would take a length of time to organize a satisfactory sanitary force for the entire State, so that even if the money were forthcoming the inauguration of the enterprise would be necessarily slow.

Registration of Herds and Necropsies as a Means of Tracing Tuberculosis.

A most effective but less speedy means of dealing with tuberculosis in herds would be based on a universal registration of the bovine animals. To each county or district would be assigned one or more trustworthy veterinarians, who should keep an accurate record of bovine animals, and of all additions and removals, and who should examine all cattle killed or that died. On the discovery of a case of tuberculosis, the disease would be identified by the chief veterinarian, and the whole herd would be subjected to the tuberculin test, and those found tuberculous would be condemned, appraised, killed and safely disposed of, and the premises disinfected, Similar precautions as under the speedy method would be adopted toward other domestic animals on the same place; toward vermin and toward tubercular attendants and new purchases.

In this way every tuberculous herd would be discovered and purified without serious delay, and at the same time the expensive tuberculin test would be reserved for herds in which tuberculosis was known to exist. The unfounded stock

objection to the tuberculin test, that it might introduce disease, would in this way be rendered absurd even to the objector himself.

This work could be probably accomplished by 100 inspectors at a cost of $150,000 or $200,000 a year. Indemnities also would be lessened, as many of the occult cases would be detected only at the butcher's, and at least the demand for values would be more gradual and more easily met.

Abattoir Inspections to Trace Tuberculosis.

A third method of tracing tuberculosis is to provide municipal or other official abattoirs in which alone farm animals designed to be marketed as human food can be killed. This has long been in use in Europe, and must one day be adopted in America, as a purely sanitary measure, no matter how it may interfere with the vested interests and monopolies of individuals. Inspection in private abattoirs can never be made as satisfactory as in public institutions, in which everything is done according to rule. Incidentally the government stamp and endorsement, furnished with all sound meats, would open to all competitors that interstate and foreign trade which is now the monopoly of the packers in certain large cities. Its effect in tracing the centres of animal tuberculosis may be inferred from the reports of the Berlin abattoirs where 75 per cent of the old cows are tuberculous, of Leipzig where 28 per cent prove affected, of Schwerin where 35 per cent are diseased, of Paris, London and Edinburgh where 22 per cent prove consumptive. With such data it is easy to follow each animal back to its herd and subject that to the tuberculin test.

If we were to combine this restricting of slaughter to the inspected government abattoirs, with a careful record of the herds and their individual animals, it would prove easy and certain to discover every centre of disease and to speedily eradicate the contagion.

The great desideratum in our present methods is a definite and effective system. Our tuberculosis commissions are in a sense free lances, with power to rove about the State and test a herd here and a herd there, as the urgency of the demand or their own judgment may dictate. And in the preliminary inquiry into the existence and relative prevalence of tuberculosis in different districts this has served a good purpose.

But now that this purpose has been accomplished, this should give place to a system which will look toward something more definite in the way of the extinction of the disease. When a herd or district is purified of the infection, due precautions should be taken to prevent its reinfection, so that the same work will not be demanded again and again in the same district, and above all that the purified herd shall not be exposed to diseased herds on all sides of it.

Let herds be excluded from cities and suburbs, or let the herds in such localities, as the most dangerous to themselves and to humanity, be the first to be put under a rigid system for the suppression of the contagium. Next to these the dairy counties in which the bovine population is the densest should be systematically attacked, and when these have been purified, the herds of the State at large, where the danger of the concentration of infection is least, should be taken in hand. Every step, however, should be subordinated to the maintaining of the ground that has been already gained, and the advance of the work in such lines as will make it possible or easy to hold all newly-acquired territory. The general plan must therefore yield in many cases so as to clear up a whole district—the less densely peopled with cattle as well as the more densely populated, so that the conquered territory shall be kept compact and easily defensible from first to last. The time for the sporadic dealing with individual herds, remote from each other is past. The knowledge and the needs of to-day unite in demanding such an appropriation and such supervision as will secure a systematic and progressive advance over the whole State, and which will look toward the purifying of our herds in every locality.

SELECTION.

SOME QUESTIONS AS TO SEX.[1]

A breeder who has had thousands of horses under his care recently wrote to a contemporary upon the subject of the control of sex: "As a practical man I absolutely refuse to believe, from a breeder's standpoint, that the sex can be controlled by the breeder. As an old breeder I may be allowed to advance the generally accepted theory of breeders that sex of progeny can only be regulated and projected by the 'Ruler of all.'" Now, this old gentleman's position is not to be wondered at. He has likely tried all the theories that have been discussed in breeders' journals during his long career, and found them wanting. Hence his falling back to the great unfailing source of consolation, a blind reference of the whole subject to the supreme source of that "simple faith" of whom it has been written, "Male and female created he them." Notwithstanding the positiveness of such a dogmatic breeder, it is nevertheless the fact that the subject of not only the control of the sex, but even its genesis, has long engaged the attention of students of living processes, and continues to do so in increasing intensity, not only on account of its attractiveness as a study, but of the rich results to be obtained therefrom. We can not entirely controvert the sweeping assertion of the observer above quoted, but it is a certain thing that a considerable advance has been made in discovery tending to an uncovering of the intent and process of that self-same "Ruler of all."

Our intention is to treat of sex. In doing so we would put ourselves to the consideration of the subject thus: What is sex? How did it originate? Can it be controlled?

What is sex? This is one of those apparently self-evident questions which are the hardest kind to answer. In ordinary language the dictionary defines it as the distinction between male and female. We might define the term thus: Sex is the word we apply to the sum of the characters which include and distinguish the one individual from the other necessary to

[1] *The Horseman*, October 31, 1895.

accomplish an act of reproduction by copulation. Sex is gramatically considered as gender. Sex is a natural distinction; gender is a verbal one. As the term is used, it infers a sharp distinction between two "genders"—male and female; it does not take into consideration the possibility of a gender that is neither male nor female, as is done in grammar. In nature, however, *there are animals "born" or developed that are neither male nor female.* In nature we have what are called *hermaphrodites—which are organisms combining within themselves the production of both male and female elements*, and which condition is believed to have been the primitive state, reproductively considered, of all multicellular animals; and in nature there is also what is called parthenogenetic reproduction, or the development of ova into adults without their union with the male sperm; the individuals produced by such process are in some cases male, in others female. But in neither hermaphrodites, as instanced rarely in the higher animals, or in parthenogenetic individuals, does reproduction by copulation of two distinct beings take place; so that the term sex had not, when originally it began to be intelligently applied, included these non-reproducers. It must, however, be carefully noted that (true) hermaphrodites in their original state are fertile, and that parthenogenesis involves an indefinite series of unsexed generations.

The word sex seems to be derived from the Latin *seco*, to cut, to make a division. A peculiar form of the word is "sect," which otherwise applied means a cutting or scion, and still otherwise a party or faction. We can all appreciate the implication when we remember that in some churches and schools the "sexes" are divided, occupying different portions of the respective buildings referred to. It will be found well to bear this derivation in mind when we come to consider what sex really is. Here we have gone as far in our answer or definition as is at present necessary in the accomplishment of the scheme we have in view in the treatment of the subject.

The popular idea of sex refers to general conformation, configuration, aspect, temperament or habit. The anatomist regards sex from the standpoint of a comparative examination of the specific and individual organs that distinguish the one individual from the other. The histologist regards sex from the view obtained by a minute or microscopical examination of

the tissues of these organs, outwardly described by the anatomist. The histologist goes further and discloses the very structure of the ultimate sexual elements—the ova and the spermatozoa. The physiologist looks at sex from the point of view of the interpretation of the uses and functions of these several organs and tissues.

For the practical purpose of this investigation we might throw the consideration of all else aside but what we have termed the ultimate element of sex—the ova and the spermatozoa. To trace these two elements, their origin, constitution and behavior, would include the answers to the questions involved in this study.

As Joseph Le Conte has put it: "*Sexual reproduction consists essentially in the union of two different cells, the germ cell and the sperm cell, to constitute one cell, the ovum.* It is in the most literal sense a union of diverse twain to form one flesh. These two cells may be called the *sex elements.* This is all that is necessary to the idea of sexual reproduction, even though the two elements may be formed by the same organ. But, further, the two elements are usually elaborated by two distinct organs, the ovary and the spermary. Those are the essential sexual organs. When these two organs are found in one individual the condition is called bisexuality or hermaphroditism. Further, in the higher animals these two organs exist in different individuals. This condition is called unisexuality. Thus there are several grades of sexuality. The sexual elements only may be separated, or, in addition, the sexual organs may be separated; or, in addition, there may be distinct sexual individuals. Any mode of reproduction not answering the above is non-sexual."

It is unnecessary to go into a minute description of these ultimate sex elements. The general principle upon which their structure is based is pretty generally understood. The great facts of recent discovery bring out the prominent and very remarkable fact that their essentials are identical. The essential part is what is called the chromatin or nuclear substance, in which is summed up all the vital force of reproductive and hereditary power. In each element—germ, female, and sperm, male—there is an equality of this essential vitalizing matter. In the process of the making ready or maturation of these ultimate elements of sex there is a remarkable series of changes

observed to occur. Each goes through a similar process of cell division by means of which they are, as it were, reduced (to use a paradoxical phrase) into four parts. In the case of the mother sperm cell each and all of these divisions mature or ripen into active and functionally perfect sperms, each capable of "fertilizing" an ovum or female germ. In the case, however, of the germ mother cell it is quite different. Instead of each of the successive divisions being matured and perfected into eggs, each capable of producing with a sperm a new being, only one main division, as it were, is favored, the other divisions being in the process thrown aside or absorbed. Now, as we shall see that each element, male and female, has descended originally from the same source of hermaphrodite condition, we ought to expect that the process and meaning of the conduct observed in each differentiated line of descent therefrom should be parallel and equivalent. So that, though there is a difference established in the process as now discovered—in the one all the results of division being perfected, in the other all but one aborted—it would seem that in the case of the germ divisions what we have described as the "abortive" portions ought, in the ancestral sex element from which each has descended, to represent what were then elements capable of impregnation for the production of perfect individuals; but that, in the evolutionary and natural process, only one of the four was carried on to maturity or to a condition capable of that necessary destiny of reproduction. The persistent element might be looked at, as it were, as a retained element; at any rate, it seems to retain the full allowance of nutritive matter that was capable originally of being devoted to the growth and ripening of all. This is a consideration of the highest moment. At maturity the egg or ovum is consequently constituted of the essential element plus an abundant store of nutritive material. Now compare this with the antithethetic element, the sperm. We have said that each of the sperm divisions became perfect and capable individually—each therefore has to receive in its individual growth so much nourishment, and this must be derived from the original amount in the mother sperm cell. In the activity of this individual growth we may imagine that the store of nourishment is pretty well used up, and that indeed there is established in each individual a ravenous hunger that must be satisfied, or there will ensue the destruction of the

sperm individuals referred to. Each of the sperms is of a spare and very active habit, then. The "persistent" ovum, on the other hand, has benefited by the absorption of the nutrition that might have otherwise been appropriated by the aborting eggs if they had been designed in the continuous history of the race (phylogeny) to have been perfected similarly. So that the ovum has had all the advantages of a favorable environment in so far as nutrition is concerned, which has been further benefited by its quiescent passivity. The reader should endeavor to fix the above in his mind, for we have unconsciously, to him, been instilling into his mind two of the most fundamental contrasts and principles of what has at last come to be called sex.

To resume: As far as the essential material of the sex elements is concerned there is no apparent distinction between the two. As to this point Julian Nelson has written: "So far as our ideas of sex imply the differentiation of male and female, the chromatin (the reproductive germ-plasm) is not sexed, but so far as it implies desire for conjugation with other chromatin differing from it by a slight variation and likewise fitted with a longing for conjugation, it (the chromatin) is sexed, but to this idea of sex the thought of male and female is foreign." The ideas of male and female have arisen subsequently in contemplating the different secondary mechanisms that have been developed in connection therewith.

We have now sufficiently advanced to realize that the distinctions that we have always associated with sex are of comparatively little account. In fact, the conclusion reached by scientists is that in the highest forms the cells born by the two sexes are absolutely neutral as far as sex itself is concerned. Sex has been evolved, indeed, from the necessity of cell conjugation and growth. The evolution of the sex can now be traced back to that stage (beyond which are the sexual forms of continuity) wherein was developed, on the same individual, from one cell which divided into two, the antithetical cells or organisms which became the starting points of what, for distinction, became known as "male" and "female." Here let the reader stop again one moment—for we have now given the clue to the origin of sex. We see in this origination absolutely nothing but a simple division of the oneness of the original essential matter of cell reproduction as an explanation of sex. So that, to recur to the derivative explanation of the word sex

itself, we find a remarkable coincidence therein between, and to adopt the idea we also find that it affords a wonderfully close approximation to the actual fact of the case—that sex is simply a *division of the reproductive matter of the cell.* Sex is therefore nothing more than a division of the all-time existing essential matter of reproduction, endowed with all the vitalities of evolutionary tendencies and of differentiating intensities. This is no doubt a most sweeping generalization, into which enter a whole series of developmental and hereditary considerations; but the truth of sex has been stated.

It is therefore interesting to consider for a moment this primitive sexual state, in multicellular animals, of hermaphroditism. The ancient idea of an hermaphrodite was an individual capable of fulfilling by turns the reproductive functions of both sexes, or one who possessed both male and female organs fully developed. Such conditions are unknown, and the ancient idea of an hermaphrodite is erroneous. But the word was applied to a condition, a perfect representation of which has been discovered to fully exist in nature, and from which, indeed, all sex has been evolved. Sir J. W. Simpson puts the matter for the investigator thus: "We have assumed that each individual is, when normally formed, originally furnished with elemental parts capable of forming one perfect set of sexual organs only;" that one set of organs is developed at the expense of the other, by reducing to obliteration or leaving in a state of rudimentariness those not so developed. The most evident examples of what we have just referred to are seen in the rudimentary mammæ of the male and the clitoris of the female. These are remnants of originally functional parts in hermaphrodite dualism or dimorphism. None of the higher animals exhibit functional hermaphroditism now, but there are examples enough of partial or other conditions of hermaphroditism to bear out the argument as to leave no doubt that the condition named was originally the normal one, and successor to that condition alluded to of a sexual reproduction, and from which dimorphic condition all multicellular animals have derived the distinction of differentiation of sex. Gegenbaur says: "The hermaphrodite stage is the lower, and the condition of distinct sexes has been derived from it. This change is due to the decrease in size of one or other organs, so that hermaphroditism is the precursor of differentiation. This

differentiation by the reduction of one kind of sexual apparatus takes place at various stages in the development of the organism, and often when the sexual organs have attained a very high degree of differentiation. In these cases ontogeny (the development or life-history of the individual) exhibits the two kinds of organs primitively united, and so causes the individual to be hermaphrodite at a certain stage of development." But the morphological sexual type of either sex comes short of comprising a complement of the developed organs of both sexes, owing to the fact that for some of the organs or parts of the sexual apparatus the same primary tissue develops into a male organ or part into a female organ in the other sex. But, again, remarks the authority from whom we are presently quoting, for some of the organs necessary to be developed in either sex alone the primary tissue required may not be capable of being converted into functional parts in the other sex. Therefore, that contingency must not be overlooked. But the preponderating evidence is in favor of a condition of primary hermaphroditism.

Having thus established the great cardinal fact of the bases of sex in an hermaphrodite oneness of reproductive element, it follows that, according to the consequent teaching of the study of embryology, every new being that is conceived comes into existence as an hermaphrodite, and that from that period onward and up to an indefinitely known period, there must be going on a struggle for a sexual supremacy, or if there is no such struggle there is a preponderating differentiation and determination toward the one "sect" or division of individuals as to the particular functional habit each is to assume. Herein lies the solution of the third important question we set ourselves to consider. What, in fact, are the conditions attending the determination to that one way or the other? Wherein can we follow the process, or preordinated intent, in this direction of "the Ruler of all?" What conditions are there existing and attending the evolution of one emphatic type of sex over the other that can be discovered or stimulated by man so as to enable him to exercise what he boasts of as "control" over these conditions of nature determining what he is so anxious to obtain control of?

We see, as the two lines of descent known as male and female originate from an hermaphrodite ancestry, that from the first

sexual reproduction of the first differentiated individuals there has been also involved an hereditary legacy therefrom of sexual dimorphism in each succeeding conjugation of the descendants of these differentiated sex ancestors. This further clinches the argument of an hermaphrodite origin of sex. Before confining our attention to the last of our questions just alluded to we have to look at the development of sex a little more definitely in regard to characteristic determinations developed.

Sexual reproduction (called "amphigonic" by Haeckel) is the fusion of two antithetical germ cells, or possibly nuclei only, containing hereditary tendencies. Thus two different sets of hereditary tendencies are mingled together, and this is the cause of the occurrence of the heritable and transmissible individual peculiarities developed by the inherent tendencies of the essential basis of hereditary or germ-plasm. The power of accomplishing this is in fact the office of amphigonic reproduction to effect. Sex has indeed been evolved as we have indicated as the means of effecting such amphigonic fusions. The division of reproductive matter resulting in a continuity of redundant alternations of sex types involves also a division of physiological labor which is seen to be so essential to the individual as well as the racial well-being of all evolutionary circles of results. The higher the evolutionary process has carried the hereditary principle of reproduction the greater is this degree of differentiation evident. The first great act in this direction was the differentiation of sex. In the first stages of this the characteristics of sex would necessarily have been very obscure. But with the increase of the ambitions of the amphigonic process, a gradual increase in the characterization of the two representations of the antithetical elements occurred. The magnificence of the destiny and the fidelity of sex are thus fully demonstrated and vindicated. From the original differentiation of a simple cell for a more definite work we have in the study of nature a panoramic succession of increasing characteristic grandeur referable to a more sublime beauty of individual male and female, form and feature, habit and sentiment, purpose and portent; with the crowning divinity of the affinity of affection in all the purity involved by a descent from a condition of self unity. To quote a well-known writer on this subject: "The phenomena of sex are no isolated ones, but express the highest outcome of the whole activities of the

organism—the literal blossoming of the individual life." The determination to the development of the male or female gland and all the differentiation that that determination involves, then, is the essential fact in the whole development or evolution of the individual. And so also the race. Thus, too, in sex we have the foundation of the whole social fabric as consequently developed and defined by the evident direction of the suggestion of the greatest good for the individual and race. Herein we have made an allusion, that of course must only be a passing one, to the demands of good society in regard to the sexual relation, as it is called. This recalls the presentation of the case from the same point of view by the distinguished Cope, of University of Pennsylvania, who in the first number of the *Monist* declared that "Man can not commit marital infidelity in the same sense that woman can, on account of his physical diversity. His unfaithfulness introduces no new blood into the family, and makes no defect in the inheritance, as does the same act on the part of the woman. The woman is in a position of trust—like the responsible officers of a bank. It is in the power of both to defraud those who trust them." Individual woman is thus a sexual trust. And the peculiar expression of the Philadelphia professor is no less significant in regard to the females of other species, particularly those which have become domesticated. Physical diversity of sex involves mental diversity as well as physiological diversity of activities—which is but expressing one more distinction established by the two. The physical diversity is also the attraction of the affinities of kind that makes all kith and kin.

We must now consider the last of the questions : Can sex be controlled? A better mode of approaching this question would be to ask : "What are the conditions that appear to determine the development of one 'sex' in preference to another in the embryonic condition of the being?" In our comparison of the habit, as it were, of body of the germ and sperm elements—the one as nutritive and passive, the other as spare and active, we have but expressed, in example, such conditions as seem to attend the behavior of the male and the female throughout existence. The female is seen to represent a favorable environment, the male an unfavorable.

But here we have entered, *in medias res*, into the realm of the question as to the control of sex. "The factors," says Geddes

and Thompson, "which are influential in determining sex are numerous, and come into play at different periods, so that it is quite possible for a germ-cell to have its future fate more than once changed. The constitution of the mother, the nutrition of the ova, the constitution of the father, the state of the male element when fertilization occurs, the embryonic nutrition—these and yet other factors have all to be considered." Such is a result, in summary, of the principal theories of later times that have had a good deal of popularity. We cannot review these theories at length, for they are pretty generally known, but we may just mention them to refresh the memory. The first to be noted is that of Thury, whose theory referred to the time of fertilization as determining sex. It was that an ovum, fertilized soon after liberation, tends to produce a female, while an older ovum will rather develop a male. Hofacker and Saddler had a theory depending upon the age of parents; that when the male parent is the older, the offspring are preponderatingly male, while if the parents be of the same age, or, *a fortiori*, if the male parent be the younger, female offspring appear in increasing numbers. Then comes the theory of Girou and others, which depended upon the comparative vigor of the parents; the sex was determined by the more vigorous parent at the time of copulation. Next we have Starkweather's theory, which also involved the idea that sex was determined by the superior parent, but in his theory it was the superior parent that produced the opposite sex. The theory of Dusing, which depends on the idea that sex is self-regulating, has been prominently discussed; it is that if one sex be in the decided minority, or under conditions that amount to the same thing, then a majority of that sex will be produced. If there be a great majority of males, for instance, there is a greater likelihood of the ova being fertilized early, but that means a probable preponderance of female offspring, and thus the balance is restored. By their authors and critics all these theories have been proven convincingly, and as convincingly condemned. There may be elements of truth in all of them, but it is evident that greater research and closer approximation to the discovery of the true condition under which nature herself solves the problem is as desirable as ever. This we believe is in sight.

What investigators into this question are doing is to attempt to determine what these decisive conditions are at

the determining period. C. M. Hollingsworth has formulated an hypothesis that is based on a relative preponderance of the conditions on which cell development depends, or on the conditions on which cell division depends, which causes the formation of the female or male generative organs or determines the sex of the individual. If, therefore, the conditions on which either factor of the developmental process depends remain constant, the requisite preponderance one way or the other may still result from variations of the other factor. It should be remembered further that both factors are required to be present in the developmental process in the formative or initial stage of the development of all organs, the reproductive organs included. Thus, when impregnation takes place at a very early period, since the ovum in its own independent course of development has not yet reached the segmenting stage, the immediate effect of the union of the female and male elements is a modification of the male element by which it is to some extent assimilated in character to the female element. In consequence there is established in the fertilized ovum at the outset a relative preponderance of the factor of cell growth in its developmental tendencies; and this, by the theory, determines to the production of the female sex. But where impregnation takes place at a late period when the ovum in its development has reached the segmenting stage its modifying action on the male element before the union is completed is less, and in consequence there is established in the fertilized ovum at the outset a preponderance of the factor of cell division, which the male element represents, and this, if the theory is correct, determines to the production of the male sex. This theory, it is seen, is but a repetition of that of Thury.

Of much more interest and value is that of Dusing, which is that a favorable environment causes an excess of females and an unfavorable one an excess of males. This is the interpretation put upon it by Brooks, of Baltimore. In Dusing's results Brooks sees an adaptation in virtue of which each organism tends to remain stationary as long as no change is needed, and to vary when variation is demanded. Dusing's own idea is that an excess of males is produced under unfavorable conditions in order to prevent too close interbreeding, which causes sterility, small size and lack of general vigor and vitality. As the evil effects of interbreeding are most marked when the

environment is unfavorable, and as the male births are then in excess, he believes that the excessive production of males is an adaptation which has been gradually acquired for the purpose of preventing close interbreeding at the time when it is injurious. Brooks criticizes this theory from the standpoint that it is not advantageous to establish an injurious character, and it is more likely by Dusing's theory that the result is crossing, which secures variability where needed, that is, when conditions are unfavorable.

We must again revert to the environmental condition in the embryonic stages. The chief of these conditions are nutrition and temperature. As to the former, many observations have been made on certain of the lower animals which are very valuable. In the case of tadpoles, for instance, it is found that when they are left to themselves the percentage of females was in the majority. In three lots the average number of the whole was fifty-seven per cent of females. In the first brood, by feeding one set with beef, the percentage of females was raised from fifty-four to seventy-eight. In the second brood, feeding on fish, the percentage rose from sixty-one to eighty-one. In the third set, when fed on especially nutritious flesh of frogs, the percentage rose from fifty-six to ninety-two. In the last of these three cases there were thus ninety-two females to eight males. Similar results are obtained in reference to bees. The quantity and quality of food seems to rule the destiny of the members of the hive. Rich, or royal, diet, and plenty of it, is necessary to develop the reproductive organs of the future queens. Sparse and plain diet, with which the future workers are regaled, retards or obstructs the sexuality of these, so that they do not develop. Up to a certain point, too, the nurse-bees can determine the future destiny of their charges by regulating the diet supplied. If a larva on the way to become a worker receives by chance some crumbs that have fallen from the royal table, fertility may be developed in that worker; or, by direct intention, a worker may be reared into a queen bee by serving her with the queen's food. Observations in regard to wasps indicate the fact that the percentage of females is greater during the months from spring to August, thus showing the relation of female development to generous nutrition, and also to temperature.

In an experiment made upon a flock of 400 ewes divided into two equal portions, one-half was fed extremely well and served

by young rams. The other half was fed poorly and served by old rams. The proportion of ewe lambs in the two cases were respectively sixty and forty per cent. In spite of the two factors the experiment was a convincing one. In the human subject prosperity and conditions insuring full nutrition and a similar habit of body in the parents tend towards the superabundance of females. The influence of the temperature has also had considerable attention paid to it in this regard. In the human species more males are born during the colder months. The same results have been noted in regard to horses. This influence must be exerted, of course, at the time in the embryonic history of the individual when the determination of sex is in progress of being fixed. Temperature may also be exerted indirectly through the functions of nutrition. Whatever controlling conditions apply to such sexual elements, as possessed by these animals must apply to the very highest. The sex elements of the latter are not materially different as to size or amenability to the same environmental conditions.

A number of factors therefore appear to co-operate in the determination of sex. The most important of these seem resolved into greater or less nutrition, operating upon parent, sex elements and embryo. In regard to the parents it may be recognized that adverse circumstances, especially of nutrition, and also age, etc., tend to the production of males; the reverse conditions favoring females. As to the sex elements a highly nourished ovum tends to the development of the female; the reverse to the development of the male. Fertilization, when the ovum is fresh and vigorous and before waste has set in, corroborates these tendencies. As to the embryo, which as we have proved is of an hermaphrodite character from which transition to unisexuality is effected by the hypertrophy (overdevelopment) of the female side or preponderance of the male in respective cases, the supreme importance of primary environmental influences must be apparent. The longer the period there is in which these influences are given to work as a consequence of the retardation of the maturation and climax of the sexual result, the more important must these influences also be, and the more effectual the results effected, whether operative directly or indirectly through the parent or otherwise. In these outside factors, again, favorable environmental conditions of nutrition, temperature, etc., tend to the production of females;

the reverse increases the probable production of males. Geddes and Thompson express the results arrived at in more precise language: "Such conditions as deficient or abnormal food, extreme temperature, deficient light, moisture and the like, are obviously such as would tend to produce a preponderance of waste over repair; such set of factors comprehend what have been included in the term of 'katabolic' habit of body, which habit tends to produce males. Similarly, the opposed set of factors, such as abundant and rich nutrition, favorable temperature, abundant light and moisture, all of which favor a constructive process, which set of factors comprehend what have been included in the term of an 'anabolic' habit of body, and those conditions result in the production of females." Put in a nutshell, all this may be thus expressed: Influences inducing katabolism (which may best be defined as conditions of low living) tend to result in the production of males; those favoring anabolism ("high" living) tend to increase the probability of females. The male is the outcome of the one, the female of the other.

It will thus be seen that there is no royal or easy road offered by science for the control of sex. Science, however, seems capable of explaining the conditions upon which nature accomplishes the determination in that respect. In the higher animals in which we are interested, the object of control is so difficult of approach by means devised by man that the best laid schemes for the purpose intended might be overturned by unthought of or unknown contingencies of even a very slight character. The lower down the scale of the animal kingdom we proceed the nearer we get to the direct objects—the sex elements—to be controlled, and the greater possibilities there are of our doing so. This statement emphasizes the positiveness of the results obtained. These results may teach the breeder, however, the way in which he must the most profitably go to approximate to a nearer fulfilment of his ambitious desire for supremacy over nature.

COMMUNICATIONS.

LIVE-STOCK INSPECTION FOR NEW ZEALAND AND AUSTRALIAN COLONIES.

VETERINARY MAGAZINE: Enclosed please find a proclamation issued by the Australian and New Zealand Government, which will explain itself. It demonstrates the fact that other countries are alive to the necessity of taking some action toward the eradication of tuberculosis and glanders.

Hoping that this will prove of interest to your readers,

I am, yours most sincerely,

R. A. ARCHIBALD.

A proclamation by His Excellency, General Sir Henry Wylie Norman, Knight Grand Cross of the most Honorable Order of St. Michael and St. George, Companion of the Most Eminent Order of the Indian Empire, Governor and Commander-in-chief of the colony of Queensland and its dependencies.

WHEREAS, By an act passed in the thirteenth year of the reign of Her Majesty, and numbered 19, entitled the "Diseased Animal Act," it is, among other things, enacted that it shall be lawful for the Governor from time to time, with the advice of the Executive Council, by proclamation, to prohibit or put restrictions on the introduction or importation of cattle, horses, sheep, goats, pigs, poultry and other animals, and of any one or more kinds of animals, into the colony of Queensland, or into any district thereof, from such places and during such times as may appear necessary, and any such proclamation to alter or revoke by a similar proclamation; and

WHEREAS, It is desirable to prevent the introduction of cattle suffering from tuberculosis and horses suffering from glanders and farcy, which diseases are readily communicable from cattle and horses respectively to the human subject, and

WHEREAS, Tuberculin has been found to be an almost infallible diagnostic of tuberculosis, and mallein an equally effective diagnostic of glanders and farcy;

Now, Therefore, I, Sir Henry Wylie Norman, the Governor aforesaid, in pursuance of the provisions of said act, and by and with the advice of the Executive Council, do hereby

notify and declare that until this, my proclamation, shall have been altered or revoked all cattle arriving from any place beyond the colonies of Australia, Tasmania and New Zealand shall, on arrival, be subjected by a duly qualified veterinary surgeon to a tuberculin test, and all horses be subjected to a mallein test, and that if any such cattle or horses shall be found to react to such test, they shall either be returned to the place from which they were shipped, or be destroyed, or shall otherwise be dealt with as the Minister charged with the administration of this act shall direct.

Given under my hand and seal at the Government House, Brisbane, this nineteenth day of June, in the year of our Lord one thousand eight hundred and ninety-five, and in the fifty-eighth year of Her Majesty's reign. By command.

HORACE TOZIER.

MR. WOODRING OF PENNSYLVANIA THANKED FOR HIS LEGISLATIVE WORK.

October 20, 1895.

HON. W. H. WOODRING:

DEAR SIR:—As a properly delegated Committee of the Pennsylvania State Veterinary Medical Association, it affords us great pleasure to comply with its instructions in thus conveying to you its official recognition and high appreciation of the very valuable services and kindly offices you have rendered to the Association during the past session of the State Legislature in the management and direction of the successful legislation which has provided for our people the safeguards of a just investigation of the proper qualifications of those who are in the future to be entrusted with the safe-keeping of their property, and who at the same time must largely relieve our people of certain well known dangers in their food supply. It is this true realization of the great value of this measure that measures for you the sincere appreciation we feel in having had through your good influences, kindly aid and support at all times, and especially when there seemed to be at certain critical periods danger of our measure being defeated. We trust that you will accept this sincere and grateful recognition, tendered you by

the entire profession of our State, and the good wishes that follow, in that success may always attend your efforts in every just and lawful undertaking.

With our sincere thanks we ask your acceptance of this humble acknowledgment, and beg leave to remain,

Most respectfully yours,

T. B. Rayner,
John R. Hart,
W. Horace Hoskins,
Committee.

A PROTESTATION.

Paris, August 1, 1895.

Professor Olof Schwarzkopf, V. M. D., Chairman of Executive Committee, Association of Veterinary Faculties of North America:

Dear Sir:—I have received your letter of July the 13th, with the program of the next meeting of the "self-named" "Association of Veterinary Faculties of North America," doing me the high honor of "either approving, altering or suggesting, as I may see fit." I thank you for the compliment, and though I know well that I am pleading for a lost cause, and that it is simply . . . foolish for me to hope that my efforts may carry their point, notwithstanding these expectations, I will permit myself to take advantage of your invitation, not to approve, alter or suggest the program, but simply to call *your* attention, that of the *members* of the Association of Veterinary Faculties of North America, and, above all, that of *every* member of the United States Veterinary Medical Association, who has at heart the name of the Association, her reputation and welfare, to only one point—that is to the

Unconstitutionality of Your Actions,

and I am not going to approve, alter or suggest on the program. What I intend to do is to ask you to stop where you are, Mr. Chairman, and to tell you and your colleagues of the Association of Veterinary Faculties of North America:

Stop! or, rather, *begin over again!*

Yes, *stop*, because you are illegal!

Yes, *begin over again*, because the work that you may do, the subjects that you may consider, the laws or regulations

that you may enact, will all be thrown away uselessly, because it cannot be entertained; because, remaining a dead letter, it will do no good to the noble work you intend to do, no good to the great reform that you will attempt to bring out; because in this land of liberty arbitral actions are illegal; and because, if your existence may serve personalities, it will do no good to American veterinary medicine.

What you may say is, "Is it Dr. Liautard who speaks thus?" "Is it he, who, after being the leading advocate of the very subjects of the program, now asks to drop them?" "Is it he, who, at the first Veterinary Congress of America, expected what he had on previous occasions urged in his paper on 'Veterinary Education; As It Was, As It Is, and As It Should Be'?" "Is it he, who, before the New York State Veterinary Medical Society, presented an address to the same effect?" "Is it he who tells us to stop when we are about considering the reforms which he has so urgently asked of us, and which, should they be brought to effect, would crown his professional work in behalf of veterinary medicine with a most glorious reward?"

Yes, it is I! and why?

Mr. Chairman, let me ask a single question: *By what authority does the "self-named" Association of Veterinary Faculties exist?*

It may be answered—By direction of that great Association for which we all work, by that great body of veterinarians, who have for years endeavored to elevate the profession, and have succeeded. Right! I grant that it became a duty for the United States Veterinary Medical Association to ask the formation of the Association of Veterinary Faculties of North America, which I have myself asked for, and which I ask for again.

But—and here are my objections to her existence, to her right of existence, to her legality—and, if I am right, I say and I repeat: *Stop where you are and begin over again.*

That which I am now going to say I wanted to say last year at the meeting at Philadelphia. Landed but just a few hours from a trip across the Atlantic, and finding my inability to be at the meeting before action was taken on the report and discussion on the new-born society, I had telegraphed to my friend, Professor Robertson, to ask for a short recess, a brief

delay, to allow me to arrive from New York. This request was denied, and I just entered the room to hear that the child was born—*a child doomed to death from its birth.* What I wanted to say at the meeting I told you, Mr. Chairman, in Philadelphia, and my remarks at that time you seemed to approve.

What were these remarks? They were imbedded in the following words, or about, viz.: "*That the Association of Veterinary Faculties of North America was not properly organized; that the fact of a* FEW *persons engaged in teaching in* SOME *of the veterinary colleges of North America being asked to unite for the purpose of organizing, had no value; that the only proper way to have the organization possessed of a solid standing was to have the* OFFICERS *of the colleges notified of the project in view, and they to delegate professors from their faculties to represent each individual college.* Speaking of *officers* of a college, I do not mean the teachers, the professors, nor the dean, nor the principal. I mean the *board of directors*, the *board of trustees*, the GUARDIANS of the charter, which is the life of a school.

WAS THIS DONE? If it was not, I say it again, *Stop and begin over again!*

You know, Mr. Chairman, it was not done.

Instead of that which, in my humble estimation, ought to have been done, what did take place?

With, perhaps, some slight error of no value, I know it was thus: NOTICES were sent to SOME, to very few, not to all, *not to every member of* SOME faculties.

Was this correct? Why to a few only? Were these few the master of all? Why should they be invited to assume certain powers, when only those who had that power did not delegate them to assume it?

These notices mentioned the intention to have a meeting to organize at the annual meeting at Philadelphia. Some were present, others were absent, (I, unfortunately, among those). The organization took place, officers were elected, and, as I said, the *child was born in a hurry, a premature delivery.* Afterwards notices were sent to those who had been elected members of the Association; they were placed on various committees, and to-day you prepare, yourself, the second act of that which, should not the subject be so important, and should I not fear to indulge in personalities, I would call *a farce, a comedy.*

Of what value can be the decision resulting from the discussion of the subjects on "Prescribed Entrance Examination;" on "State Boards of Veterinary Examiners and their Relations to Veterinary Colleges;" on "Uniform Degrees;" on "Competitive Examinations for Veterinary Faculties,' with an amalgam like that which composes your organization viz.:

1. *Representatives, mostly all, without sanction, authority or power to represent.*

2. *Representatives of two and three year schools.*

3. *Representatives of private institutions and of colleges attached to universities, as departments;* and

4. In the presence of schools which exist now and are not represented in your association of *faculties*, and still more, who are not represented in the mother national body.

Mr. Chairman, the work that lays before you seems to me very simple, and can be performed at once, without any one fearing that his pride has lost any of its right. *You recognize your illegal organization and state so to the Association.* You ask power to continue your work as a committee, not as an association, and then *begin over again* in obtaining your OFFICIAL appointment from the trustees and directors of the various places where veterinary education is carried out. You can then reorganize later on, and be prepared to enter into the performance of your work "*as it should be*," and with the certainty of receiving the approval and support of every member of the profession.

Mr. Chairman, I am miles away from Des Moines. On account of unavoidable circumstances, I am unable to be at the meeting of the National Society, and must trust to writing that which I fear can scarcely be communicated, as it should be, except by *one fully convinced*. Have I succeeded in giving you, or any of your colleagues, *that conviction?* I hope I have. And, if such is the case, I shall be grateful to all of you to have listened, not to my words, but to the laws of rightfulness and equity; and if you permit me, I will then renew my efforts, offer my services for the cause in question—the elevation, the perfecting of education in *American Veterinary Institutions.*

Yours truly,

A. LIAUTARD, M. D., V. M. D.

EDITORIALS.

THE BICYCLE, PETROLEUM WAGON AND ELECTRIC CAR SCARE.

The wide spread and rapidly growing popularity of the bicycle as a means of travel and recreation ; the advent of the so-called "horseless carriage," heralded in the columns of the public press by the most extravagant claims of general efficiency, and the rapid and certain displacement of the street car horse by electricity and steam, have operated to cause speculation as the effect of these innovations upon the horse. Several prominent daily papers have editorially announced the early disappearance of the horse from the city streets, and a very considerable narrowing of his field of usefulness elsewhere, but they do not as yet recognize the necessity of placing horses in our zoological gardens, "that this noble animal may not perish utterly," as a recent writer fears.

The bicycle has, to a slight extent, taken upon itself work that was previously done by the carriage horse, and has undoubtedly injured the livery business, especially in the city, and somewhat in the country. While it is safe to affirm that nine of every ten devotees of the wheel are young people, who could not or would not keep a horse and carriage even were there no bicycles, there is no evading the fact that many a young man accompanies his "best girl" on a Sunday afternoon upon the "silent steed," and many a family and many an individual now use the wheel for periodical recreation, who, were there no bicycles, would patronize the livery stable. Yet, the very young, the timid, the infirm, the aged, and the severely decorous, will never ride the wheel, nor can the latter ever permanently displace the horse in the affections of the true lover of the horse. Sixty years ago, when the steam locomotive came to be recognized in England as an efficient means of transportation, the same seven-days-alarm seized horse owners, but though steam lifted many burdens from the horse, and somewhat restricted his uses, he did not become extinct ; on the contrary, he is more valuable to-day than then.

Another fact should not be overlooked, namely : that good, smooth roads are not only essential to the life of cycling, but

by increasing the pleasure of driving they make a demand for driving horses. Of this there is no doubt, and here in the city of Philadelphia and throughout its suburban villages, there have never been at any time in the past so many horses kept exclusively for pleasure as to-day.

But what of the new petroleum, steam and electric road carriages? The following excerpt of an article written by a manufacturer of petroleum carriages may be of interest:

"The advent of a horseless carriage on the streets of Philadelphia, probably marks the fair beginning of a time. A vehicle of the same pattern has appeared in the New York City streets. If the new motor proves to be able to do the work of a horse, or a pair of horses, at less cost, a change much greater than that which has followed the introduction of the trolley, will be made in the appearance of our streets and in the customs of the people.

A horseless carriage that can be used on ordinary roads and over the present grades, has been the dream of inventors for thirty years. Traction or road engines that carry their own means of propulsion, and are equal to ordinary roads, are not uncommon. A steam roller is a familiar example, while in some parts of Europe slow-going road engines have been in use for years in the hauling of freight. It is only within the present year, however, that the makers of automatic carriages have been able to show results that justify the belief that these carriages may come into general use, and that very soon. The great race between horseless carriages in France last June, has served to bring the new vehicles into wide notice. Another test is about to be made in England, and $5000 in prizes will be awarded for the best form of horseless carriage.

The race in France last June was from Paris to Bordeaux and return. Sixty-six horseless vehicles propelled by petroleum, steam power or electricity, and five or six petroleum bicycles, competed. The carriage which made the best run was a two-seated vehicle with petroleum motor. It made the entire trip of 727 miles in two days and fifty-three minutes, at the average of 14.9 miles an hour. There was no stop of any moment at Bordeaux, but an accident on the return trip delayed the carriage for more than an hour. Its average speed, barring this enforced stop, was a little better than fifteen miles an hour. The other petroleum driven carriages made excellent time, but

the gas, steam and electric driven carriages did not make a very good showing. The carriages were frequently accompanied by bicycle riders for a short distance, but the wheelmen could not maintain the pace.

A vehicle that will carry two men and its own motive power 727 miles in two days, up and down hills and over only fair roads, has staying power. It is no mere toy, and if in addition, as is claimed, the cost of running it is trifling, it is a safe prediction that the horseless carriage will become very soon a familiar sight upon our highways. The poor horse, whose importance has diminished by the successive uses of steam, electricity and the bicycle, will find himself almost as much out of date as the ox and the ass, when carriages carrying their own motive power begin to occupy the highways. The demand for smooth hard roads will then become irresistible, and with the high speed at which petroleum motor carriages can be driven a new peril will be added to the use or crossing of the highway by pedestrians."

An interesting sequel to the above is the fact that the identical petroleum wagon that won the race "from Bordeaux to Paris and return" in June last, is the one now upon the streets of Philadelphia, owned by Gimbel Bros., and used solely as an advertisement. By the irony of fate it appears to be useless as a means of transportation, at least in a crowded city. Several expert engineers have failed to keep it from periodical smash-ups, and when it gets into a car-track it cannot get out till it has reached either a switch or a crossing track, unless it be "blocked" out. Of course, we may expect that improvements will come to render it more efficient, but we scarcely expect to see any of these "motors" made so cheap, durable and manageable as to supplant horse-power. To-day they are merely ingenious and expensive toys.

THE ASSOCIATION OF VETERINARY FACULTIES OF NORTH AMERICA.

In this number of the VETERINARY MAGAZINE we print a somewhat remarkable communication addressed to the Association of Veterinary Faculties of North America, by Dr. A. Liautard, which seems to require a reply.

*

Stripped of its persiflage, the article charges that the Association of Veterinary Faculties of North America has no power to represent, because the "*Boards of Directors*, the *Boards of Trustees*, the GUARDIANS of the charters" of the several schools which have formed this unholy alliance were not notified of the project, and, therefore, did not appoint representatives with power to act.

The imputation, therefore, is that such men as Drs. Charles P. Lyman, Dean of Harvard Veterinary School; Charles McEachran, Principal of the Veterinary Department of McGill University; Olaf Schwarzkopf, Dean of McKillip Veterinary College; Junius Wattles, Dean of Kansas City Veterinary College; H. J. Detmers, Dean of Veterinary Department of Ohio State University, and others, assumed powers that did not belong to them and were all guilty of a most egregious and inexcusable blunder which forced from Dr. Liautard his gentle and *courteous* "protestation." Now this whole tirade is too silly for serious discussion; it cites not one single fact which requires either explanation or justification. The Association of Veterinary Faculties of North America ("self-named") is neither "illegal" nor legal, "unconstitutional" nor constitutional, for it is subject to no laws but of its own making, and it is safe to say that it will not transgress these. Thus far all those schools which really wish to elevate the standard of veterinary education in North America have been represented by *properly appointed* delegates, who, in most cases, are the representative, active, responsible and trusted business heads of their respective schools, the men who make these institutions what they are. There are boards of trustees and boards of trustees; some are such in truth, others are mere figure-heads, but the fact remains that, whether they be one or the other, they should be reached through the dean or principal that they have appointed or to whom they owe their official connection with the school. These school officers were notified—not once, but several times; not of a few schools, but of all—of the movement to organize an association in which each school should be represented, and it is not for Dr. Liautard or any one else to charge that any one officer so notified failed to go to his board of trustees for power to represent the school, if it was necessary that he should.

The Association is honestly and earnestly trying to elevate the standard of veterinary instruction within its own doors.

The work is going on unostentatiously and amicably and a great deal has been already accomplished.

There are a few schools which have not yet seen fit to help along this worthy enterprise, and it is to be hoped that they will not longer withhold their support from it, much less injure the profession by antagonizing it. The American Veterinary College stands pledged to the perfecting of veterinary education, and we expect and shall welcome its co-operation with other schools in a grand, concerted movement, such as can be made only by an Association of Veterinary Faculties of North America.

JOHN W. ADAMS,
Secretary.

PROCEEDINGS OF SOCIETIES.

NEW JERSEY STATE VETERINARY MEDICAL ASSOCIATION.

There was an unusually large meeting of the Veterinary Medical Association of New Jersey in Achtel Stetter's, at 842 Broad street, Newark, on Thursday, October 10, 1895. It was called to order shortly after eleven o'clock by the president, Dr. J. W. Hawk, of Newark. There were present Drs. J. Gerth and W. Runge, of Newark; J. C. Dustan, of Morristown; J. M. Everett, of Hacketts-town; M. M. Stage, of Dorer; R. O. Hasbrouck, of Passaic; Hugh Exton, of Washington; B. F. King, of Little Silver; William H. Lawes, of Red Bank; William Gall, of Mattawan; A. Brown, of Windsor; L. P. Harley, of Hopewell; E. Britton, of Long Branch; S. Lockwood, of Woodbridge, and J. W. Stickler, M. D., of East Orange.

President Hawk made an address, in which he referred to the so-called "Anthrax" which has been scaring the people of the State during the last few months, and declared his belief that there was no anthrax in New Jersey, as there had never been an official report on the matter from a veterinarian. The secretary reported Dr. A. D. Edwards, of Atlantic Highlands, as an applicant for member-ship; Dr. Dustan read a paper on the "Organization and Growth of the Associa-tion;" Dr. Runge reported on the result of a trip to Cumberland county in search of anthrax and had specimens and a microscope on hand for the benefit of the members.

After Dr. Gerth had read an interesting paper on "Meat Inspection," the meet-ing adjourned for dinner at two o'clock in the afternoon.

Reconvened at 3.40 o'clock. Dr. Gerth's paper was discussed at length by Drs. Runge, Dustan, Everett, Hawk and King. On motion of Dr. Hawk, a committee of three was appointed to investigate the manner in which the money was spent which was appropriated by the State for the stamping out of tuberculosis in New Jersey by a Commission of the State Agricultural Board. Drs. L. P. Hurley, and W. B. E. Miller and William Gall were named as the essayists for the next meeting. The gathering adjourned to meet in April.

S. Lockwood,
Secretary.

MASSACHUSETTS VETERINARY ASSOCIATION.

The regular monthly meeting of the Massachusetts Veterinary Association was held at 19 Boylston Place, September 25, 1895, at 8 p. m., the president, Dr. J. M. Parker, in the chair.

A large number of the members were present.

On motion of Dr. Osgood, Drs. Beckett, Blackwood and Winchester were appointed a committee to draw up resolutions on the death of Dr. Williamson Bryden.

A large number of interesting cases were reported, the discussion of which lasted until a late hour, making it one of the most interesting meetings we have had for some time—*the everlasting subject of tuberculosis not being mentioned.*

HOWARD P. ROGERS, *Secretary.*

The regular monthly meeting of the Massachusetts Veterinary Association was held at 19 Boylston Place, Wednesday evening, October 23, 1895; Dr. Parker in the chair. There was a good attendance.

Dr. Howard reported for the Executive Committee that the Secretary be instructed to send notices that the By-laws will be enforced where members do not pay their dues before January 1, 1896.

Dr. Beckett reported for the Special Committee on Resolutions on the death of Dr. Bryden as follows:

WHEREAS, It has pleased the Almighty in His divine providence to remove from our midst our esteemed colleague, Williamson Bryden; and

WHEREAS, The intimate relation and business intercourse with him have been most pleasant, it makes it befitting that we publicly record our appreciation of him; therefore be it

Resolved, That in the loss of Dr. Williamson Bryden we lose a friend and valued member of our association and profession; therefore be it

Resolved, That the deep sympathy of this association be extended to his relatives and friends; and be it further

Resolved, That a copy of these resolutions be forwarded to his relatives, spread upon our records, and published in the veterinary journals.

E. C. BECKETT,
THOMAS BLACKWOOD,
J. F. WINCHESTER,
Committee.

A number of interesting cases were reported and discussed.

Dr. A. Shannon, of Malden, applied for membership.

Drs. Beckett, Parker, Labaw and Lewis promised papers for future meetings.

HOWARD P. ROGERS, *Secretary.*

KEYSTONE VETERINARY MEDICAL ASSOCIATION.

The September meeting of the Keystone Veterinary Medical Association was called to order by president Lintz, at the office of Dr. Hoskins, Tuesday evening, September 17, 1895, when W. H. Hoskins, J. R. Hart, Charles Lintz, W. L. Rhoads and J. T. McAnulty, answered roll call. A communication from Dr. F. Bridge, expressing regret at his inability to be present, as he had been called to Robesonia, was read.

Dr. Hoskins, as chairman of the legislative committee, reported very little excitement in that line as the State Veterinarians or the State Board of Veterinary Medical Examiners had not been appointed.

At a request from the treasurer and secretary, president Lintz appointed Hart and Hoskins as a committee to audit the books for the past year.

Dr. J. R. Hart as the Keystone Veterinary Medical Association delegate to Cresson, gave a very entertaining account of that meeting, which was both interesting and instructive, and merited a much larger attendance, as the papers read were of a high order.

Dr. Hoskins, as delegate from the Keystone Veterinary Medical Association to Des Moines, credited it with being the largest meeting the Association has ever had. He gave a glowing account of the entertainment offered at Chicago. This with his full though concise description of the meeting, banquet, etc., made the mouth of the poor stay-at-home water, practically, as well as figuratively speaking, and they all determined that their watchword of next year would be "On to the National Meeting."

The Society adjourned to meet October 8, 1895, at Broad and Filbert streets, when officers for the ensuing year will be elected.

W. L. RHOADS, *Secretary.*

The October meeting of Keystone Veterinary Medical Association was called to order by president Lintz at the new and more commodious quarters, on the northwest corner of Broad and Filbert streets, at 8.30, Tuesday evening, on the eighth inst. This move was imperative as the increase in attendance by both members and visitors had outgrown the very pleasant environments of Dr. Hoskins' office.

The members present were: Drs. Bridge, Eves, Goentner, Hoskins, J. R. Hart, Kooker, Litnz, Rhoads and L. Pearson. Dr. Allen was also present.

Dr. Hoskins, as chairman of the legislative committee, reported having received several communications from veterinarians now located in other States who wish to locate in Pennsylvania, and want to know with what laws they must comply.

Dr. Hart, as chairman of the auditing committee, reported the accounts satisfactory and the treasury in a position to declare a dividend.

The Constitution and By-laws were now revised and adopted after some discussion.

Dr. Hoskins read a very interesting paper entitled "What I have learned in Associations." He thus brought out many pungent truths which more clearly portrayed the inestimable worth of the Association as a factor for the advancement and protection of veterinary science, also the personal advantages to the individual member.

Dr. Eves reported a case of excessively contracted flexor tendons in colt, one month old. This elicited considerable discussion and much valuable information.

Dr. Allen cited a case of farcy which had been tested with mallein, and promised to give a detailed account at the next meeting. This brought into discussion the reliability of mallein as a diagnostic agent; it was maintained by a majority present that on account of the variations in its manufacture it will not, as a rule, give absolute satisfaction.

Tuberculin was held in higher repute than ever before, Prof. Nocard claiming an universal accuracy, while the Massachusetts Commission claim less than one-half per cent of mistakes with its use.

This being the annual meeting, the nomination and election of officers for the ensuing year were now in order; there being but one nominee for each office, the secretary was instructed to cast the ballot, and the elections were declared unanimous,

as follows: President, J. R. Hart; vice president, W. S. Kooker; treasurer, F. Bridge, secretary, Rhoads: Directors, H. P. Eves, C. T. Goentner, C. Lintz, L. Pearson and W. H. Hoskins.

After the new officers had assumed their duties the meeting adjourned to meet Tuesday evening, November 12, 1895.

W. L. RHOADS, *Secretary.*

MONTREAL VETERINARY MEDICAL ASSOCIATION.

The twenty first annual opening meeting of the Montreal Veterinary Medical Association was held in the library of the faculty of Comparative Medicine on Thursday evening, October 10, 1895, with the president, Dr. Adami, in the chair. There was a good attendance of members and candidates for admission.

Minutes of the the last meeting were read and approved.

The special business of the meeting was the election of officers for the ensuing year. The honorary president, Dr. D. McEachran took the chair, and the ballot resulted in the election of the following: president, Dr. M. C. Baker; first vice-president, D. N. D. Gunn; second vice-president, Mr. E. C. Thurston; secretary and treasurer, Harri H. Dell; librarian, Mr. J. A. Ness. Fourteen new members were added to the roll, and Dr. Martin, professor of pathology, was elected to honorary membership.

Dr. Adami referred to the admirable condition of the library, which was largely due to the zeal and energy of Mr. Thurston, the retiring librarian.

A reporting committee was appointed consisting of Messrs. F. Kee and S. C. Richards to act with the secretary in communicating reports of the meetings to the various journals.

Dr. Baker thanked the Associaton for the honorable position to which they had called him and outlined the work for the year.

Dr. Adami assured the members of his continued interest in the work of the Association.

Messrs. Green and McCarrey were instructed to procure material for experimental purposes, and the essayists for the next meeting were appointed, after which the meeting adjourned.

HARRI H. DELL,
Secretary and Treasurer.

A meeting of the Montreal Veterinary Medical Association was held on October 24, 1895, in the Library of the Faculty of Comparative Medicine. There was a large attendance of members and visitors, among the latter being Dr. Miller, of Burlington, Vt. The minutes of the last meeting were read and approved.

The president introduced Dr. Miller, a graduate of '87, who presented a paper on the "Control of Anthrax by Attenuated Germ Products." He detailed the results of his experiments with anthrax vaccine upon a herd of cattle in the vicinity of Burlington. The infected area had not been free from the disease for twenty years. When called professionally to the herd in question, ten animals had died already, and before the vaccine could be procured, four others had succumbed.

To produce immunity two inoculations are required, the first being preparatory for the second, which is injected ten or twelve days after. The primary inoculation of the herd took place on September 6, the second upon September 18, with the result that only one animal died upon the fifth day following the first inoculation, since which time the herd had remained perfectly healthy in the face of the greatest possible danger of infection from the surroundings, which could not be altered. The only noticeable effect of the remedy upon the animals was a distinct rise of temperature which invariably manifested itself within a few hours, reaching in some cases to 106° F. and subsiding again in the majority of cases in three days, but in some cases extending to the seventh day.

The death of the one animal could not be attributed to any untoward effect of the agent, but only substantiates the claim for the antitoxin; namely, that the first injection is intended only to prepare the system to withstand the shock of the second. He described the routine of the process by which a sufficient degree of attenuation is reached. The amount of antitoxin used in each case was .25 c. c. The preparatory inoculation was made behind the right elbow, the second or truly immunizing one in the corresponding locality on the opposite side. During the treatment the animal is not necessarily subjected to any change either in diet or surroundings, the only indication of its activity being the thermometric readings. He also pointed out the necessity of using a microscope in distinguishing between anthrax proper and symptomatic anthrax or "blackleg." Furthermore he pointed out that as anthrax proper and symptomatic anthrax are two distinct diseases, depending upon germs of truly different biological and morphological attributes, the use of anthrax antitoxin would be obviously an error in symptomatic anthrax.

Mr. James E. Craik read a carefully prepared paper on parturient apoplexy in a cow, giving the results of his experience with the disease, most of the members being of the opinion that the nervous symptoms are the result of one or more toxins in the blood. Several members described their method of treatment, the success of which in most cases being dependent upon the length of time elapsing between parturition and the onset of the disease, the longer delayed the more amenable to treatment. Dr. Miller stated that he had used hypodermically liquor strychninae hydrochloratis in two-dram doses every hour until convalescence. This, in cases under observation was very successful, but had not been used in a sufficient number of cases to induce him to speak positively as to its efficacy.

Mr. S. McNeider reported a very interesting case of peritonitis in the horse, describing the symptoms, rapid course and fatal termination of the disease. A brief discussion followed, after which the essayists for the next meeting were appointed, and the meeting adjourned.

HARRI H. DELL,
Secretary-Treasurer.

OHIO STATE VETERINARY MEDICAL ASSOCIATION.

The semi-annual meeting of the Ohio State Veterinary Medical Association convened in the parlors of the Gibson House, Cincinnati, on the evening of October 3, 1895. There was neither president, first or second vice-president present, so

the secretary called the meeting to order at 8 p. m., and proposed that Dr. J. C. Meyers, Jr., act as chairman, which was readily agreed to.

Dr. Meyers on taking the chair expressed his regret at the small number of members present.

A communication, accompanied by considerable printed matter, was received from Miss Cicelia Ritter, asking for the association's condemnation of vivisection, and its signature to a petition asking for its total abolishment. The association did not believe in the total abolition of vivisection, but all thought it should be restricted somewhat by law; and so instructed the secretary to inform Miss Ritter.

The morning meeting was called to order at 9.30 a. m. by Dr. J. C. Meyers, Jr.

The following cases were reported by Dr. S. E. Bretz, Little Sandusky, Ohio:

Case I. Subject was a chestnut mare, ten years old, due to foal, owned by my father, and kept in the same barn with my own horses. She had an attack of influenza in April last, accompanied with laryngo-pharyngitis. At first she was dull and dejected, mucous membranes red, legs and ears cold, pulse 120, temperature 104, weak, staggering gait, cough, sore throat, with great prostration and loss of appetite. She was placed in a box-stall, well bedded and ventilated, but not draughty, with warm clothing and bandages. Prescribed belladonna, quinine and glycyrrhiza internally, given with syringe every three hours. Ammonia liniment to the throat, followed by many-tailed bandage, were applied. The symptoms remained stationary for four days, and the animal was doing fairly well until the fifth day, when my father called me, saying the mare was choking to death. I rushed to the stall, and while the mare was almost suffocated, and had fallen to her knees, I thrust my jack knife into the trachea about midway between the inferior maxilla and sternum, and relief was instantaneous. I then ordered my tracheotomy tube from my office, but it was broken on the way, so I applied a twitch to one ear and then dissected out a part of two of the rings of the trachea, and with strings around the neck I tied and inserted a funnel until I went to the tin shop and had a tube made to order. The temperature rose to 106°, with all other symptoms increased in severity. The tube was removed twice a day and cleaned in carbolized solution until the third day, when the swelling became so great around the orifice that the tube could no longer reach the trachea, so that the opening was left to itself, other than to be cleansed several times a day with a swab.

At this time the mare began to show signs of labor pains. I had an assistant draw the swollen tissue together across the opening of the trachea, so that natural labor pains would be made complete. I then removed the colt, which was alive and healthy, and has done well. The mare made a complete recovery. Later this same mare had two severe attacks of acute indigestion, and was punctured six times at the first sickness and seven times at the second, and recovered from both. I then neurotomized her for navicular disease, and at the present time she has all the appearance of a sound and healthy animal.

Case II. Subject was a bay mare, owned by J. L. Lewis, of Harpser, Ohio. The attendant came to my office and said the mare had the colic, and asked for a colic mixture. The mare had been pregnant for ten months, so I told the man if one dose did not relieve her he should let me see her. The medicine was given, pain relieved and mare put to work. About one month later he came to my office

and said same mare was same as before, and, as she was due to foal, requested me to call and see her. On my arrival found the amniotic fluid had escaped, but there were no labor pains, so I proceeded to remove the colt, which was alive, and has since done well. I then inserted my hand to remove the placenta, and to my surprise came in contact with a dead fetus, much smaller than the other. It was so putrid that the eyes had disappeared. The skin and hair would slip off at the slightest touch, and the odor was most offensive. I removed it, cleansed the womb with a weak solution of carbolic acid, gave a laxative, followed with quinin and morphin. On my return the next day I found a well marked case of metro-peritonitis, with the following symptoms: small, hard pulse, elevated temperature, loss of appetite, hurried respiration, mouth hot, mucous membranes injected, stamping with hind feet, turning head towards flanks, swollen vulva, and a discharge therefrom. The lining membrane of the vulva was black and ulcerated and possessed a most offensive odor. So bad was the smell that I could hardly encourage the attendant to administer the medicine. Gave quinin and morphin with hypo-sulphite of soda. The feces would collect in the rectum, and the mare was unable to expel them with the aid of injections. I had a small boy to stand on a box, and with his arm well oiled remove the feces from the much swollen rectum. Injected into the womb a solution of carbolic acid and withdrew the fluid, and so continued until all odor and dark colored fluid was removed. This was repeated twice a day and the animal recovered.

Dr. Shaw reported a case of a mare bred several times to a Clyde stallion with no success; was one day bred to a French coach horse, and on the evening of same day bred again to the Clyde. She became pregnant and gave birth to twin colts, one after the Clyde and one after the coach, their shape and color plainly showing this.

Dr. Gribble reported having been called to Centreville, Ohio, to attend a mare that could not foal, and had removed twin colts, both dead, one a mule, the other a horse. The history given him was that the mare was bred several times to a certain stallion with no success; that she was bred to this horse one morning, and on the same day a man came along with a jack, and claimed that jacks would often get in foal mares that stallions failed on; so for a stipulated sum induced the owner of the mare to use the jack, with the above results.

Dr. W. C. Fair, of Cleveland, reported a case of a horse leaving home in apparently perfect health, and on being driven a short distance became paralyzed behind and died. On post mortem she was found to have but one kidney, and that the other, enormously enlarged, contained considerable pus.

The following resolution was unanimously carried:

Whereas, The State of Ohio is in danger of becoming flooded with quacks, empirics and unqualified diplomatized practitioners, who by their inefficiency are a menace to the owners of horses and cattle, as well as a detriment to our professional and social standing; be it

Resolved, That we, as an association of graduated veterinary surgeons, recognize the State Board of Veterinary Examiners; also, that we appreciate the law passed by the Seventy-first General Assembly of the State of Ohio, May 24, 1894, to regulate the practice of veterinary medicine and surgery; and we will assist said board in its endeavors to carry out this law, with a view to protecting the public again t impostors, as well as to elevate the standard of our profession.

It was duly proposed and carried that a committee composed of Drs. Meyers, Jr., W. Shaw and W. H. Gribble, be empowered to draft amendments to the State law governing the practice of veterinary medicine, and present the same at the next annual meeting of this association.

No further business appearing, the association adjourned until January, 1896.

As secretary we desire to say that so small a number as were present at this meeting is somewhat discouraging to the few hard workers, especially as the work done is for the benefit of all. The clamoring of the veterinarians of this State for legislation, and the lack of interest shown in united effort in trying to get it, reminds one of the old darkey that prayed and prayed to the good Lord to bring him a turkey, but none came; but he changed his prayer and prayed that the Lord send him out to get a turkey. It is needless to say that then the turkey came. So with us. Members of the Ohio Association, instead of *praying* for legislation let us by hard work and united effort *get* legislation; let us use the law we now have as an entering wedge, to be amended, not only for our own benefit, but to the benefit of the live-stock interests of one of the best States in the Union; and at the annual meeting to be held in Columbus in January, let us see so many present that we will experience an old-fashioned veterinary revival to the joy of all.

WM. H. GRIBBLE, D. V. S., *Secretary.*

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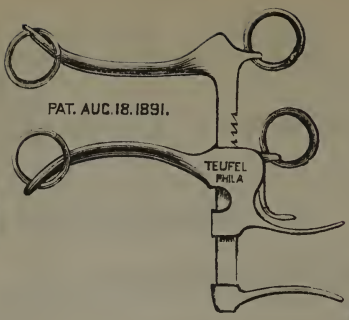

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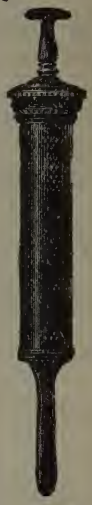

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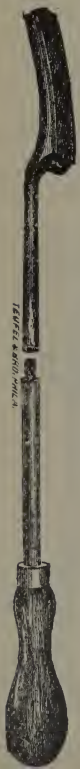

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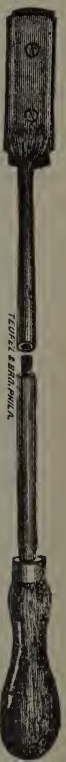

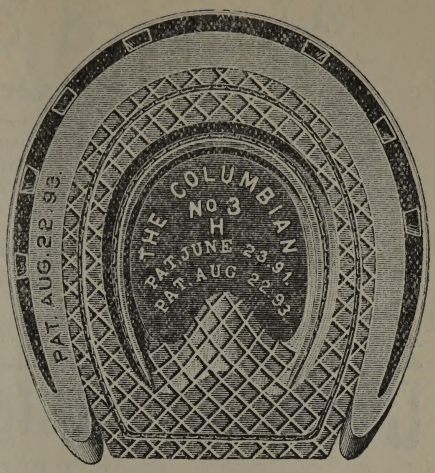

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